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Side Door Latch/Hinge Assembly Evaluation

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16. Abstract <p>Ejections cases involving passenger cars (excluding sport cars) and light trucks were retrieved from NASS files 1981 through 1983 for statistical study; relevant hard copies of accidents during 1980 through 1984 period were also examined for detailed damage description of the affected vehicles, especially to latches and hinges. The results are presented in tables using fourteen (14) relevant parameters.</p> <p>Ejection rates were determined using recent FARS and POLK data for 173 makes and models and ranked in descending order. Twenty four (24) latch/hinge specimens were tested to destruction, in which the maximum loads in both longitudinal and transverse directions and the corresponding load deformation curves recorded.</p> <p>It was found that ejection is a rare event, representing less than two percent (2%) of all NASS cases. Ejections through side doors contribute over 50 percent of the total occupant ejections. Although occupant ejection incidents are relatively infrequent, the casualties are extraordinarily high. The results of hard copy accident report study show that door hinges seldom failed during car crashes and door latch failures were the primary cause of door openings. Therefore, the latch strengths are the prime target for investigation. Tests show that the ejection rates are strongly correlated with maximum latch loads and energy absorption in longitudinal direction. A lesser correlation exists between the ultimate transverse latch loads and occupant ejection rates.</p>		
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SUMMARY

Ejections cases involving passenger cars (excluding sport cars) and light trucks were retrieved from NASS files 1981 through 1983 for statistical study; relevant hard copies of accidents during 1980 through 1984 period were also examined for detailed damage description of the affected vehicles, especially to latches and hinges. The results are presented in tables using fourteen (14) relevant parameters.

Ejection rates were determined using recent FARS and POLK data for 173 makes and models and ranked in descending order. Twenty four (24) latch/hinge specimens were tested to destruction, in which the maximum loads in both longitudinal and transverse directions and the corresponding load deformation curves recorded.

1) Occupant ejection is a rare event, contained in less than two percent of NASS cases, but is a major factor in fatalities, in that one out every five fatalities in FARS cases was associated with ejection.

2) About fifty percent (50%) of ejections (with AIS 3 and above) were through the door and thus should be related to the strength or toughness of hinge/latch system of the vehicle. The remaining ejections were through side window, windshield or rear window, etc. Among the cases attributable to side door ejection, the number due to latch failure causing spontaneous disengagement, could not be ascertained for most cases.

3) The leading source of ejection-related injuries was ground impact, followed by impact with car interior parts prior to ejection, including windshield and window glass, pillar/roof frames and steering columns; the

leading body regions impacted were head/face followed by chest, limbs and other body regions.

4) During the period of 1981 to 1983, among the fatality cases, the foreign made cars are associated usually with higher ejection rates and domestic cars associated with lower ejection rates.

5) Among 24 specimens of 1983 vintage, the ejection rates are strongly correlated with latch loads in the longitudinal direction, and have a reasonable level of correlation with latch loads in the transverse direction. In both cases, the correlation coefficients are negative in sign (i.e. ejections increase as loads decrease) as expected. Ejection rates are virtually independent of hinge loads in both longitudinal and transverse directions. Actually the correlation analysis for the hinge loads does not serve any practical purpose in this study, for the following reasons:

1. Accident data show that hinges seldom fail in a car crash. Thus one would not expect any appreciable correlation with ejection rates.
2. About half of the hinges were not tested to failure, since they withstood the maximum load available from the apparatus. Thus for these cases, one could not calculate a meaningful correlation with the ejection rate.

6) The areas under load-deformation curves for the latch tests are also correlated with ejection rates, more strongly for the longitudinal loads than the transverse. This suggests that the toughness or energy absorption of the latch specimens correlate strongly with static loads.

7) Latch specimens selected from models/makes associated with low ejection rates generally sustained two to three times the 2,500 pounds

longitudinal loads specified by FMVSS No.206. Eight specimens in low ejection rate stratum withstood 5,000 lbs (2272 kg) at a minimum.

8) Due to the diversified design and failure modes, no clear cut weakness of latch design can be pinpointed. The results appear to be mixed at best and specific recommendations for improved design of latch are premature and must await future study. Therefore, no specific recommendations concerning improved latch designs and tests are given in this study.

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1. INTRODUCTION

Real world accident data show that a significant number of highway fatalities/injuries have occurred as a result of occupant ejections. Among them, many are killed each year as a result of ejection through the side doors of passenger cars. It is thought that a statistical study may provide in-depth information on the causal effects of such accidents. It may also be used to examine critically the adequacy of requirements of the FMVSS No.206, "Door Locks and Door Retention Components," and develop procedures and means to upgrade the standard. The present study is an initial attempt to provide the needed information to accomplish this goal.

2. STATISTICAL ANALYSIS OF EJECTION DATA

2.1 Objective and Scope Analysis

The purpose of this statistical analysis is to study the interrelations between the parameters that are relevant to occupant ejection rates for vehicle in highway accidents. Heavy vehicles such as buses, trucks, trailers and sport cars are excluded from consideration, since the behavior of these vehicles in reference to the occupant ejections is vastly different from that of a passenger car. However, light trucks, as defined by the gross vehicle weight rating (GVWR) not exceeding 10,000 lbs (4,545 kg), are included in the consideration.

2.2 Data Sources

Data sources for the study were the annual compilations of the National Accident Sampling System (NASS), the Fatal Accident Reporting System (FARS) and the POLK annual national vehicle population profile (POLK) deposited in the NIH computer. The NASS and FARS data sets contain infor-

mation that describe all accidents that satisfy certain inclusion criteria. NASS data are sampled from all types of accidents involving moving vehicles. The data, when properly adjusted, should represent a statistical distribution of all accidents, both fatal or nonfatal and involving ejection or non-ejection. The NASS data contain more details than FARS and hard copies of NASS data describing the accidents are available for examination. Most of the hard copy cases have photographic records of varying quality.

FARS data include all fatal accidents. All NASS data that involve fatally injured occupants could be found in the FARS files. Conversely, any FARS cases that happened to be sampled for inclusion in the NASS files would have a hard copy available for a narrative description as well as a photographic record. In this sense, these two files are, to a degree, complementary to each other for a detailed study.

POLK, Inc. publishes each year the fleet population data in the U.S. for all the registered passenger cars and light trucks of the model year 1968 or later. At the beginning of this study the 1983 data was the latest available edition. It was manually keyed and stored in a computer file for ready access. Data sets of prior years, in particular, those for years 1982 and 1981 are not available at the NIH computer facility.

During the planning stage of this study the POLK, NASS and FARS files available in the NIH computer were examined in detail. It was obvious that the data sets were too large for an economically feasible statistical study.

It was decided then that the emphasis would be placed on recent events with late model cars. Thus, only NASS and FARS cases of the calendar years 1981, 1982 and 1983 were included. To conserve the labor

requirement only the automated 1983 POLK files were used and 1981/1982 data were derived from the 1983 POLK data. It was decided also that the data files should be edited into a condensed version by eliminating incompatible and/or irrelevant data as explained in the next section.

2.3 Processing and Editing of the Files

The data files for NASS and FARS were reviewed and condensed into ejection related accidents by discarding the non-ejection accident cases. Also discarded were the unprocessable records, i.e., those that failed to identify the vehicle make or model. In addition, accidents that involved vehicles of model years earlier than 1968 were omitted since the vehicle population data of these vehicles was not given in POLK. The total available and condensed files for NASS for the years 1981 through 1983 are given below:

NASS	1981	1982	1983
Total available records	5,986	8,718	10,966
Ejection-Related (Fatal and Non-Fatal)	216	259	332

The corresponding FARS files are as follows:

FARS	1981	1982	1983
Total available records	44,000	39,092	37,916
Ejection-Related (excluding pedestrian cases)	9,924	9,579	9,472

The above table highlights the contention that ejection is frequently associated with fatalities; nearly 25 percent of the fatalities occurred in ejection-related accident.

2.3.1 Segregation of Passenger Cars and Sports Cars

From the NASS condensed record files, those involving passenger cars (including sports cars) can be identified by specifying the body type codes 1 through 9. The total number of records was reduced to:

calendar year	1981	1982	1983
NASS ejection counts (All passenger cars)	131	138	165

At this point, one could eliminate the contamination of the sports car in the record files. Since the codes do not contain a "SPORTSCAR" category this must be done manually. For this purpose, all known sports car makes and models are listed in a Table 1. After eliminating the sports cars from the list, the remaining NASS cases were reduced to:

calendar year	1981	1982	1983
NASS ejection counts (Non-sport passenger cars)	115	116	138

It is clear that ejection is a rare event in a NASS data set. It should be noted that the remaining cases are the ejection counts, some of which could involve vehicles of the same model. The next step was to group them according to model so that a quantitative analysis could be made. It was obvious that such an effort would be unwarranted since each grouping would involve a very few cases. Such a low population would exaggerate the ejection rates and cause highly biased and unreliable results. To justify a meaningful study, a special data base specifically for ejection cases should be developed. Unfortunately, this cannot be accomplished with NASS data.

Table - 1

SPORT MODEL CARS CORRESPONDING WITH THE NASS CODE

MAKE	MODEL
Chevrolet (20)	Corvair (6) Corvette (4) Camaro (9) Monza (12)
BMW (34)	Coupe (32)
Porsche (45)	928 (35) 911 (31) 930/Turbo (36) 924 (34) 914 (33) 944 (37)
Renault (46)	Fuego (38)
Ford (12)	Exp (14)
Datsun (35)	240/260/280 (34) 200SX (32)
Mercury (14)	Cougar XR7 (5) Cyclone (2) LN7 (14) Cougar (4)
Mazda (41)	RX7 (34) RX4 (33) RX2 (31)
Fiat (36)	850 (34) 124 (32) X-1/9 (36)
Pontiac (22)	Firebird/Transam (9) Lemans/Tempest (1)
Plymouth (9)	Barracuda (5)
Audi (32)	5000 (35)
Buick (18)	Opel Manta/1900 (32)
Volks (30)	Sciroco (38)
Alfa Romeo (31)	all models
MG (43)	
Triumph (50)	

(NASS code is the number
with parentheses)

Similar procedures were used to process the FARS ejection data. The results are summarized below:

calendar year	1981	1982	1983
No. of records (All passenger cars)	6,677	6,275	6,035
No. of records (Excluding sports cars)	4,070	5,108	4,930

The above FARS records are large enough to be sub-grouped according to the model of the involved vehicles. For example, for the year 1983, there were 201 such groups, and for the combined years 1982 and 1983, there were 210. For the combined years 1981 through 1983, there were also 210 model groupings.

After eliminating the sports cars from the list, the number of models for each of the calendar years was reduced by approximately 20 percent. For example, the models contained in 1983 were reduced from 201 to 162. The models for 1982 and 1983 and 1981 through 1983 were reduced to 173. This data was used in ejection rate study.

2.3.2 Light Trucks

NASS and FARS data for Light Trucks, i.e. GVWR of 10,000 lbs (4,545 kg) or less, were collected under three groups: Pickups, Vans and "Other Light Truck" vehicles. The grouping, in terms of body-type codes, is described below:

- o PICKUPS include "pickups" and "pickups with a camper" with respective body codes 50 and 51 (only NASS code 50 available for 1981).
- o VANS include "vans", "commercial cutaway vans", "other vans" and "unknown vans", or respective body codes 40, 41, 48 and 49 (only NASS code 51 used in 1981).

o OTHER LIGHT TRUCKS includes "light trucks", "van based motorhomes", "pickup based motorhomes", "all-terrain vehicles" and "auto based short utilities" assigned body codes 12, 42, and 52-69 (NASS codes 41, 43, 52 and 53 for 1981).

The number of Light Truck ejection records in the FARS and NASS data sets is as follows:

FARS	1982	1983
PICKUPS	2128	2134
VANS	350	375
OTHER	709	791

(i.e. 1981 data has not been used for this study)

NASS	1981	1982	1983
PICKUPS	29	54	88
VANS	8	15	14
OTHER	3	26	43

2.3.3 Reduction of the POLK Data

Three disk files, two for the passenger cars (domestic and import), and one for the light trucks, were created by manual entry of the 1983 POLK data and were stored at NIH under the following names:

- WSM6XQQ.POLK.PAS.DOMESTIC.DAT (Domestic passenger cars)
- WSM6XQQ.POLK.PAS.IMPORT.DAT (Import passenger cars)
- WSM6XQQ. POLK.LTRK.DAT (Light trucks, all)

Each file contains make and model, current-year, and total registered in 1983, and was coded in the following common formats:

VARIABLE	LENGTH	COLUMN	TYPE
MAKE	4	1-4	N
MODEL *	2	6-7	N
TAMT (Tot. all years)	10	8-17	N
YAMT (1983 Total)	10	18-27	N

(* : NASS model code, N: Numeric)

The models were classified according to the most comprehensive NASS coding manual. For models that are separately listed in POLK but have a single NASS code, only the subtotal for the particular NASS codes was given. The file contents were then grouped into two SAS data sets, one for Passenger cars and one for Light Trucks, to be stored at NIH under the following designations:

WSM6XQQ.POLK.PASS.SAS83.JUL1285	(Passenger (279))
WSM6XQQ.POLK.LTRK.SAS83.JUL1285	(Light trucks (62))

2.3.4 Data Merging

To facilitate the data analysis and to enhance the statistical inference of the results, it was decided that attempts should be made to merge the files. Three-way merging was tried: NASS - FARS, NASS - POLK, and FARS - POLK.

The merging of NASS - FARS could bring out more details for those cases common to both files. Also, it could shed light on the statistical relationships between the fatal vs nonfatal ejection cases. It was noted during the perusal of the file the cases in common are too few. To make them compatible to each other so that merging could be carried out would not justify an excessive effort. For this reason, this merging was not carried out.

The NASS - POLK merging was also not carried out. From a previous section, it was observed that the NASS accident cases (counts) involving occupant ejection from nonsport passenger cars were less than 130 for any of the three calendar years under consideration. However, the categories of different model vehicles of interest to us could easily exceed 200. It was therefore decided that NASS data relevant to the present study was adequate only for a statistical distribution study but too sparse for a statistically meaningful analysis of ejection rates.

The only successful merge was between the FARS - POLK files. As mentioned before, the only automated POLK files available in the NIH computer were for the calendar year 1983. A tacit assumption was made that the fleet populations over the period of 1981 through 1983 were constant. This postulation was considered reasonable under the circumstances, since we were including only those models with a fleet population of at least 50,000 and thus would not be subject to any dramatic change in annual fleet population. With such fleet sizes, a moderate change in the population would still not produce any appreciable change in the ejection rate since the number of ejections is such a small figure compared to the population. It was considered unsatisfactory to obtain the fleet population for 1982 by simply subtracting the number of 1983 model cars from the total 1983 population. Since we were including model years from 1978 and up, the attrition of the older model cars would not be properly reflected and would lead to lower populations for 1982 and 1981 and hence higher values for the ejection rates for these years. There may have been some error in the ejection rate calculations for some of the models with low populations because of this assumption, and in a future study, the actual

populations of the years 1981 and 1982 should be used.

2.4 Data Analysis

2.4.1 Selection of Relevant Parameters

In order to examine the causes and effects of the ejections relative to occupant injuries, the weighted accident data from NASS were distributed across various parameters. A total of over 140 FARS and NASS variables were examined and of these 14 were eventually selected for use in describing ejection accidents. These variables listed in Table 2 included vehicle class, accident mode, occupant ejection crash modes (first harmful event, impact type), ejection path (ejection area, ejection medium, medium status), injury source and severity (interior contact points, body region by OIC, maximum injury level by AIS) etc.

2.4.2 Frequency Distributions of Ejection Type Accidents

Using the selected variables, cross tabulations of NASS-based frequency distributions of ejection-related occupant injuries were obtained. Tables A-1 through A-82 in Appendix A show the results for nonsports cars and light trucks, respectively.

2.4.3 Ejection Distribution Summary

The analysis of the National Accident Sampling System (NASS) data for 1981, 1982 and 1983 produced the following findings regarding nonsports passenger car ejections (in many cases the categories overlap and thus are not additive):

Non-Fatal Injuries

(256 complete NASS records only, for years 1981, 1982 and 1983, excluding 46 cases unknown)

- o 75 percent of total non-fatal ejection injuries result from side-area (door and window) ejection, compared to 12 percent from windshield, 8 percent from rear-area, and 5 percent from roof ejection.
- o 40 percent of non-fatal ejection injuries occur through door ejection.
- o 41 percent of total ejection injuries occur on impacts to the right or left side of the ejecting vehicle (compared to 23 percent on frontal impact and 2 percent on rear impact); the remaining 34 percent of total injuries occur on impacts to the undercarriage or roof of the ejecting vehicle.
- o 64 percent of non-fatal injuries occur in single-vehicle accidents, while multiple collisions account for the other 36 percent.
- o 77 percent of injuries incurred in multiple-vehicle collisions occur through angular impact to the ejecting vehicle.
- o 19 percent of total non-fatal injuries result from single-vehicle rollover.
- o Single-vehicle collisions with fixed objects account for 43 percent of total non-fatal injuries.
- o 52 percent of door ejection injuries result from multiple-vehicle collisions versus 27 percent of side window ejection injuries.
- o In non-fatal injuries, the medium through which ejections occur (door, window, roof structure) is open prior to impact in 19 percent total cases.
- o 16 percent of total non-fatal injuries occur through bonded (fixed) windows separated on collision force or internal contact.
- o The majority 63 percent of total injuries, occurs through doors operable windows or roof structures (convertible, sun roof, T-roof) that were closed or partial closed when damage.
- o 3 percent of injuries occurs when a fixed vehicle structure (e.g., standard roof) is torn/ripped open so as to permit ejection.
- o A higher percentage of single-vehicle accidents involve doors or windows open before impact than multi-vehicle collisions.
- o Ground impact is the most frequently cited injury source and a major cause of skull injuries.

- o Facial and skull regions account for majority of total injuries (52%); chest and neck are other leading body regions.
- o 55 percent of multi-car accident involve 2-door sedans.
- o Among injurious and fatal collisions with stationary objects, 62 percent involve traffic signs and longitudinal roadway barriers.

Fatalities:

(67 cases involved in ejection fatalities)

- o 68 percent of ejection fatalities result from side-area ejection and 22 percent from windshield ejection; 39 percent of deaths occur through side impacts.
- o Nearly 70 percent of ejection fatalities are associated with single-car accidents; collision with fixed objects constitute a majority (54%) of object-collision fatalities involved in single-car accidents.
- o Door ejections account for 44 percent of ejection fatalities resulting from multi-vehicle collisions.
- o 50 percent of ejection fatalities occur through doors, windows roof structures open prior to impact or separated or ripped-open on impact.
- o Side impacts were responsible for 89 percent of open-media (door, windows, sun-roof..) fatalities, and 41 percent of closed-media (doors, windows) fatalities.
- o A majority of open-media (doors, windows) fatalities (56%) are due to collisions with other motor vehicles in transport in either direction.

2.4.4 Analysis of Hard Copy NASS Cases

As mentioned before, for most accidents which were sampled by the NASS, narrative reports with some photographic records are available for examination. These reports are not processed and are only deposited in the archive in the form as submitted. The purpose of this task was to analyze, in some depth, the "hard copy" reports of recent accidents (1980-1984) involving side door ejections.

From the 1980-1984 NASS data, accidents which had one or more side door ejections were identified automatically by computer sorting. From a total of 212 cases thus extracted, 47 cases (22%) could not be used because their reports did not include such essential information as damage to the vehicle, vehicle make and model, and/or slide illustration of the accident. The remaining 165 cases were chosen and analyzed. There are 54 from the 1984 data set, 41 from 1983, 28 from 1982, 32 from 1981 and 10 from 1980 (see Appendix B). The 1980 NASS data was poor because the records did not contain well documented vehicle information.

For each chosen case, the following information was recorded: the make, model, model year and body type of the vehicle, its crash mode or object contacted, whether the vehicle overturned during the accident, the sex and age of the occupant(s) who were ejected, and the occupant's ejection path, maximum AIS level, and injury source. An attempt was made to determine from the reports and accompanying slides the extent and pattern of the damage to the vehicle structure, especially to its side doors, and whether the ejection was attributable to a door latch or a hinge failure. Detailed information for each case for the years 1980-1984 is given in Appendix B. The following summarizes the major findings from these cases.

It was found that an overwhelming percentage of ejections was attributable to problems with the door latches, either indicated explicitly or being deduced from the analysis in no less than 142 cases. There were 7 in the 1980 set, 29 in the 1981, 24 in the 1982, 35 in the 1983 and 47 in the 1984 set. For late-model cars, with model year 1978 or later, the most common type of latch failure was the latch lock mechanism somehow popping

out of the striker for unknown reasons.

It is unfortunate that only 165 cases were available for study and that these covered a wide range of makes and models, so that no statistically significant comparison of the performance of various car lines could be made. Although the focus of this contract is on late model cars, only 55 cases during calendar years 1980-1984 involved vehicles of model years 1978 or later; i.e., 26 in 1984, 16 in 1983, 9 in 1982, 4 in 1981 and none in 1980 (Table 3). The remaining 110 cases involved vehicles of model year earlier than 1978 in the calendar year 1980-1984. There were 28 in the 1984, 25 in the 1983, 19 in the 1982, 28 in the 1981 and 10 in the 1980 (Table 4). The statistics show that age of the vehicles may contribute to many of the door mechanism failures. Due to the normal wear and gradual degradation of door mechanisms, the older vehicles were undoubtedly more prone to latch failure even in an average accident. Also, in several cases, the latch or striker broke off or pulled out, mostly from the older vehicles. In several reports on cars of the 1970's or earlier it was noted that the hinges were rusted and the strikers were loose.

In many cases the condition of latch/hinge mechanisms were not clearly shown in the slides or described in the reports. Frequently, the vehicle was photographed from such a distance, that the latch/hinge mechanisms were not even visible. In some cases where the door latch was blamed for an ejection, the actual cause was not clearly stated or was not even mentioned. Also ejections may be caused by the door opening due to the occupant hitting the door handle, or even the door not being closed properly. Since it is impossible to rule out any of the inadvertent causes of the accident, one could not ascertain whether the lock mechanism was in

Table - 2

LISTING OF 14 VARIABLES SELECTED FOR ANALYSIS

NO.	VARIABLES NAMES	DEFINITION
1	BODYREG1	Body region
2	BODYTYPE	Body type of vehicle
3	EJCTMED	Ejection medium
4	EJCTAREA	Ejection area
5	ENTRAP	Entrapment
6	EJECTION	Ejection
7	HARMEV1	First harmful event
8	IMPTYPE	Type of most severe impact
9	INJSEV	Injury severity
10	MAIS	Maximun known OCC. AIS
11	MANCOLL	Manner of collision (Base on F.H.E.)
12	MEDSTA	Medium status
13	OBJCONT1	Object contact
14	VEHROLE	Vehicle role

Table - 3

1984 EJECTION CASES FOR MODEL YEAR 78 OR LATER

make	VEHICLE		ROLL OVER	FAILURE MECHANISM				REMARKS
	model	year	bodytype	hinge latch broke pop /torn out	striker anchor pull loose /torn /crush	door A/B post twist/ buckle	door A/B post side torn rip off	
Plymouth	Horizon	81	5/4 dr HB	-	-	-	-	Suspect latch failure, door handle missing.
Honda	Civic	80	3/2 dr HB	-	-	-	-	Suspect latch failure, left front panel crushed.
Mercury	Bobcat	78	3/2 dr HB	-	-	-	-	Suspect latch failure, door open.
Ford	T. Bird	84	2-dr SD	-	-	-	-	Suspect latch failure, right door sprung open.
Ford	T. Bird	79	2-dr SD	-	-	-	-	Suspect latch failure, door sprung open.
Chev.	Chevette	84	3/2 dr HB	-	-	-	-	Suspect latch failure, right front door open, buckled inward.
Chev.	Camaro	78	2-dr SD	-	-	-	-	Suspect latch failure, and door sprung.
Dodge	Omni	79	2-dr SD	X	X	-	X	Latch & hinge failed, right door open detached at top hinge.
Ford	Mustang	80	2-dr SD	-	-	-	-	Suspect latch failure, minor dents. door bottom shows mud.

Table - 3 (continued)

1982 EJECTION CASES FOR MODEL YEAR 78 OR LATER									
make	VEHICLE model	year	bodytype	ROLL OVER	hinge latch broke pop /torn out	FAILURE MECHANISM striker anchor door pull loose buckle torn out /torn /crush off	door A/B post A/B post side twist torn rip buckle off	REMARKS	
Buick	Opel	82	2-dr SD	N	-	-	X	Door badly bent & open, latch damaged, three cars involved.	-
Pontiac	Phoenix	80	2-dr SD	N	-	-	X	Side brush with another car. Suspect latch failure due to roof crush, and broken B-pillar.	-
Plymouth	Champ	82	2-dr HB	N	-	-	X	Suspect latch failure due to bent door.	-
Mazda	GLC	80	3/2-dr HB	Y	-	-	-	Suspect latch failure due to car sagging to right after hitting a pole.	-
Mercury	Cougar	78	2-dr SD	N	-	X	-	Hit an incoming truck, left crushed cause door to open on roof and right side.	-
Mercury	Zephyr	80	4-dr SD	N	-	-	X	Left side ripped off and left front roof crushed, after hitting a truck.	X
Ford	Fairmont	78	2-dr SD	Y	-	-	-	Suspect latch failure, door and roof dented only in a noncollision accident.	-
Olds	Cutlass	81	2-dr SD	N	-	-	X	Suspect latch failure, door attached but crushed, after hitting a boulder.	X
Chev.	M. Carlo	78	2-dr SD	Y	X	-	X	Suspect hinge failure, due to front panel crush after hitting a tree..op	-

Table - 3 (continued)

1983 EJECTION CASES FOR MODEL YEAR 78 OR LATER										
make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM				REMARKS	
	model	year			hinge latch broke /torn	pop out	striker pull out	door anchor loose /torn		
Buick	Regal	80	2-dr SD	N	-	-	-	-	-	Suspect latch failure, door open but in line.
Ford	Fiesta	78	2-dr SD	Y	-	-	-	-	-	Suspect latch failure, no slides report states, right door dented & ajar.
Olds	Cutlass	84	2-dr SD	N	-	X	-	-	-	Sheet metal damage only, door open during accident.
Pontiac	Grand Prix	83	2-dr SD	N	-	-	X	-	-	B pillar twist caused anchorage failure, struck a tree.
Olds	Cutlass	78	sta. wagon	Y	-	-	-	-	X	Vehicle demolished collided with a train.
Plymouth	Volare	78	4-dr SD	N	-	-	-	-	-	Suspect latch failure, left front door dented only.
Chev.	Camaro	82	3/2 dr HB	Y	-	-	-	X	-	Suspect latch failure, that caused door to open, and damaged during rollover.
Ford	Mustang Cobra	78	3/2 dr HB	N	-	X	-	-	-	Suspect latch failure, door bent and sprang open, due to occupant-door impact.
Toyota	Corolla	81	2-dr SD	N	-	-	-	-	-	Latch is broken, but the door intact & in line after impacted with 2 cars.

Table - 3 (continued)

1983 EJECTION CASES FOR MODEL YEAR 78 OR LATER

VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM				REMARKS
make	model	year		hinge latch broke /torn	pop out	striker pull out	door anchor loose /torn	
Subaru	GL	82	Y	-	-	-	-	Suspect latch failure, car hit a tree, minor dents only.
Chrysler	LeBaron	83	N	-	-	-	-	Suspect latch failure, sheet metal damage to rear panel.
Dodge	Omni	79	N	-	-	-	X	Suspect latch failure, door attached but ripped open.
BMW	320i	83	N	-	-	-	-	Suspect latch failure, hit a side of a truck, door is dented and sprang open.
Toyota Cor./Tercel	81	3/2 dr HB	N	-	-	-	-	Latch failure, hit a curb, door open but in line.
Mazda	GLC	79	Y	-	-	-	-	Latch failure reported, hit a ditch.
Porsche	924	79	Y	X	X	X	X	Extensive sheet metal damages; A-pillar crushed; door missing.

Table - 3 (continued)

1984 EJECTION CASES FOR MODEL YEAR 78 OR LATER

make	VEHICLE		ROLL OVER	FAILURE MECHANISM					REMARKS
	model	year		hinge latch broke /torn	striker pop out	anchor pull out	door loose /torn	A/B post twist/ off buckle	
Dodge	Diplomat	79	N	-	X	-	-	-	Door open but latch not damaged.
Honda	Civic	82	Y	-	-	-	-	X	Side structure torn apart, with roof damage.
Honda	Civic	82	N	-	X	-	X	-	Latch mechanism failed, but striker intact.
Fiat	Custom	78	Y	-	-	-	-	-	Suspect lock mechanism failure door jammed.
Olds	98	82	N	-	-	-	-	-	Suspect door latch mechanism failure/jammed.
Plymouth	Horizon	79	Y	-	X	-	-	-	Suspect unlocking during accident, door jammed open, latch failed.
Olds	Delta	79	N	-	-	-	X	-	Suspect latch pop open and jammed.
Dodge	Aries	83	N	-	-	-	-	-	Suspect latch failure.
Ford	Fiesta	78	Y	-	-	-	-	-	Suspect latch failure, door open & bent on impact.

Table - 3 (continued)

1984 EJECTION CASES FOR MODEL YEAR 78 OR LATER									
make	model	VEHICLE year	bodytype	ROLL OVER	FAILURE MECHANISM				
					hinge latch broke pop /torn out	striker pull out	anchor door loose buckle /torn /crush	door A/B post torn twist/ off buckle	A/B post side rip off
Toyota	Corona	78	2-dr SD	Y	-	-	-	-	-
Ford	Escort	82	3/2 dr HB	N	-	-	-	X	-
Honda	Accord	82	4-dr SD	Y	-	-	-	X	-
Datsun	210	81	Sta. WG	N	-	-	-	-	-
Mercury	Zephyr	78	Sta. WG	Y	-	-	-	X	-
Buick	Regal	80	2-dr SD	N	-	-	-	-	X
Dodge	Diplomat	83	4-dr SD	N	-	-	-	-	-
Chev.	M. Carlo	78	2-dr SD	Y	-	-	-	-	X

REMARKS

Suspect latch failure,
entire structure bent to
the left.Suspect latch failure, left
front panel separated from
the door.Suspect latch failure,
A-pillar and top of door
crushed downwards, B-pillar
intact.Suspect latch failure,
damage right rear panel
rear end of car.Suspect latch failure,
right front door bent
outward, front panel
separated.Suspect latch failure,
left front panel partially
separated.Suspect latch failure,
only dent.Suspect latch failure,
dents & roof crush.

Table - 3 (continued)

1981 EJECTION CASES FOR MODEL YEAR 78 OR LATER											
make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM					REMARKS	
	model	year			hinge broke /torn out	latch pop out	striker pull out	anchor door loose buckle /torn /crush	door A/B post twist/ torn off		A/B post side rip off
Chev.	Camaro	79	2-dr SD	Y	-	-	-	-	X	-	Suspect latch failure, roof crushed down, right door dented and bent.
Chev.	Monza	80	2-dr SD	Y	-	X	-	-	-	X	Hit a culvert, head on; car flip over.
Mazda	GLC	80	3/5 dr HB	Y	-	-	-	-	X	-	Roof damaged, A-pillar twist sideways.
BMW	320i	81	2-dr SD	N	X	-	-	-	-	X	Vine snagged door handle causing hinge failure.

Table - 4

1980 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM				REMARKS	
	model	year			hinge broke /torn	latch pop out	striker pull out	anchor loose /torn /crush		door twist/ off
AMC	Grenlin	72	2-dr SD	Y	-	-	X	-	-	Suspect hinge & latch failure. Left door striker loose, hinge rusted. Left side dents only.
Austin	Healy	59	2-dr SD	N	X	-	-	-	-	Suspect hinge failure. Left door detached hitting right barrier head-on. Dents to side.
Ford	T. bird	70	2-dr SD	N	-	X	-	-	-	Suspect latch failure, left door opened, latch torn off
Volks.	Sq. Back	66	3/5-dr HB	Y	X	-	-	-	X	Suspect latch & hinge failure, hitting the curb. Left front door detached at the top hinge, and side bent upward at B-pillar, A-pillar tilted downward.
BMW	2002	73	2-dr SD	N	-	X	-	-	-	Suspect latch failure. Hit an incoming tractor-trailer. Latch mechanism torn off of B-pillar, door slightly open.

Table - 4 (continued)

1980 EJECTION CASES FOR MODEL YEAR BEFORE 78											
make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM				REMARKS		
	model	year			hinge broke /torn	latch pop out	striker pull out	door anchor loose /torn /crush off		A/B post twist/ off buckle	A/B post side torn off
Mercury	Cougar	70	2-dr SD	N	X	X	-	-	X	-	Right door separated, torn off at hinge & latch hitting a pole on the curb. The rear panel is crushed. Damage to the right side is very severe.
Volks.	Beetle	65	2-dr SD	Y	-	-	-	-	-	-	Suspect latch failure, hitting the right side of oncoming truck.
AMC	Gremlin	70	3/5 dr HB	N	-	-	-	-	-	-	Suspect latch failure, hitting a fence head-on. Occupant ejected. Minor damage.
Mercury	Montego	70	4-dr SD	Y	X	-	-	-	X	-	Suspect hinge/latch failure Right door opened, then broke off the hinge, A-pillar pushed forward.
Olds	Toronado	76	2-dr SD	N	-	-	-	-	-	-	Suspect latch failure.

Table - 4 (continued)

1981 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM						REMARKS	
	model	year			hinge broke /torn	latch pop out	striker pull out	anchor loose /torn	door buckle crush off	door A/B post twist/ torn off		A/B post side rip off
Plymouth	Satellite	74	2-dr SD	N	-	-	-	-	-	X	-	Suspect latch failure. Hitting guardrail caused right door to jam open. A-pillar tilted down.
Chev.	Bel Air	55	2-dr SD	N	-	-	-	-	-	-	-	Suspect latch failure. Collided with parking meter. Driver ejected through left door after hitting window glass/frame.
Pontiac	Lemans	67	Convert.	N	-	-	-	-	-	-	-	Suspect latch failure. After hitting some dense shrubbery, driver probably fell from the car.
Plymouth	Valiant	75	4-dr SD	N	-	-	-	-	-	-	-	Suspect latch failure, door opened upon hitting bushes.
Chev.	Caprice	74	4-dr SD	N	-	-	-	-	X	-	-	Suspect latch failure, buckled inward due to collision.
Volks.	Bug	61	2-dr SD	N	-	-	-	-	-	-	-	Suspect latch failure, A- pillar and left door dented by occupant's bodies.
Mazda	Rx-4	75	3/5-dr HB	N	-	-	-	-	-	X	-	Suspect hinge failure, right front door detached along A-pillar & hinge, B- pillar detached at bottom, panel crushed.

Table - 4 (continued)

1981 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		ROLL OVER	FAILURE MECHANISM					REMARKS
	model	year		hinge broke /torn	latch pop out	striker pull out	door anchor loose /torn	A/B post twist/ torn off	
Olds	F-85	63	N	-	-	-	-	-	Suspect latch failure. Hitting a bridge support head-on caused right front door to spring open. A-pillar crushed.
Volks	1300	66	Y	X	-	-	-	-	Suspect latch/hinge failure, both doors opened. Left A-pillar was crushed, pushing the left doors downward.
Ford	Falcon	63	N	-	-	-	-	-	Suspect latch failure from hitting guardrail. Right door open and dented.
Plymouth	Duster	74	Y	-	-	-	-	-	Suspect latch failure. Hit a flower bed on the curb. Due to left side damage, latch failure caused occupant to be ejected.
Dodge	Charger	72	N	-	-	-	-	-	Door latch failure. Left door sprang open during accident, resulting in complete ejection.
Ford	Mustang II	74	Y	-	-	-	X	-	Door latch failure. Hitting a tree caused the left door to spring open. Crushed but still attached.
Pontiac	Grand Safari	74	N	-	-	-	-	-	Door latch failure. Head-on collision with pickup truck caused left door to spring open.

Table - 4 (continued)

1981 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	model	year	body type	ROLL OVER	hinge latch broke pop out / torn out	latch anchor door loose buckle / torn / crush off	door A/B post A/B post side	REMARKS
Dodge	Charger	74	2 dr CO	Y	X	-	-	Suspect door latch failure. Collision with fence. Right A-pillar tilted down & backward when roof crushed. Hinge damaged, door sprung open.
Ford	Mustang	72	2 dr CO	N	-	X	-	Suspect latch failure. Collided with curb. Right door bent & jammed open, but in line.
Buick	Century	76	4 dr CO	Y	-	-	-	Suspect latch failure. Hitting some barrels deeply dented right front door & pushed it down slightly. Hood crushed.
Volvo	240 GLE	65	2 dr CO	N	-	-	X	Suspect latch failure. After hitting oncoming van door jammed open at hinge area. Right side A-pillar tilted sideways.
Volvo	Bug	69	2 dr CO	Y	-	X	-	Suspect latch failure. Hit a concrete post, then a tree. Sheet metal buckling and then latch failure caused door to spring open.
Ford	Mustang	74	4 dr CO	N	X	-	-	Suspect hinge failure, right front door crushed, rear door detached at top hinge.

Table - 4 (continued)

1981 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		ROLL OVER	FAILURE MECHANISM				REMARKS
	model	year		hinge broke / torn	latch pop out	striker pull out	door anchor loose / torn / crush off	
Pontiac	Grandville	74	N	-	-	-	-	-
								Suspect latch failure. Passenger fell out of car.
Chev.	Impala	74	N	-	-	-	X	-
								Hit a fire hydrant head-on, then a concrete light pole. Right door opened, sheet metal bent.
Ford	Gran Torino	73	N	-	-	-	X	-
								Latch failure, left door crushed and opened. Left rear panel separated.
Pontiac	Lemans	67	N	-	-	-	-	-
								Suspect latch failure.
Plymouth	Fury II	73	N	-	-	-	-	-
								Suspect latch failure, 2 cars collided, right door sprang open.
Chev.	Malibu	76	N	-	-	-	-	-
								Suspect latch failure, 2/3 cars involved in accident, but no ejection.
Toyota	Celica	76	N	-	X	-	X	-
								Suspect door latch failure. Right rear panel crushed, door sprang open prior to impact with a pole, then was torn off.
Olds.	Omega Salon	75	Y	-	-	-	-	-
								Suspect latch failure. Roof crushed, left front door opened & jammed at the latch. Right door open.

Table - 4 (continued)

1982 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM							REMARKS
	model	year			hinge broke /torn	latch pop out	striker pull out	door anchor loose /torn	door buckle torn off	A/B post twist/ buckle off	post side rip off	
Dodge	Polara	69		N	-	X	-	-	-	-	-	Suspect latch failure. latch broken, door opened on impact, hitting a left side of oncoming car from the right.
Datsun		71	St. WG	N	-	X	-	-	X	-	X	Damage left side extended to the roof, collided with trailer then another car. 3 cars involved.
American Motors	Gremlin	73	3/2-dr HB	N	-	-	-	-	-	-	-	Suspect latch failure.
Plymouth Road-	runner	68	2-dr SD	N	-	-	-	-	-	-	-	Suspect latch failure, car went off the road and into the ditch. No damage.
Buick	Opel 1900	72	4-dr SD	Y	X	-	-	-	X	-	-	Suspect latch failure, right front & left rear doors distorted due to prying, right rear door jammed with missing lock button.
Chev.	Camaro LT	77	2-dr SD	Y	-	-	-	-	-	-	X	Suspect latch failure, left door opened on impact with the pole.
Pontiac	Firebird	77	2-dr SD	Y	X	-	-	-	-	X	-	Suspect latch failure. Both doors are gone, right A- pillar pushed inward slight- ly at bottom.

Table - 4 (continued)

1982 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM				REMARKS
	model	year			hinge latch broke /torn	striker pop out	anchor pull /torn	door twist/ crush off	
Olds.	Omega Salon	75	2-dr SD	Y	-	-	-	-	Suspect latch failure, right door opened and dented but in line.
Chrysler	Cordoba	76	2-dr SD	N	X	-	-	X	Left door is missing, hinge broke, left front panel crushed, A-pillar intact, B-pillar is missing.
Olds.	88	55	2-dr SD	N	-	-	-	-	Suspect latch failure, 2 cars involved, left front door sprung.
Pontiac	Ventura	76	2-dr SD	N	-	-	-	-	Suspect door latch failure 2 cars involved in accident Both doors dented and bent in the metal near hinge, but in line.
Ford	LTD	72	2-dr SD	N	-	X	-	X	Suspect latch failure. Hit a post, impact severe enough to break the latch and striker.
Ford	Mustang	71	2-dr SD	N	-	-	-	-	Suspect latch failure, Door sprang open during the right side impact.
Chev.	Bel Air	61	4-dr SD	N	-	-	-	-	Door latch failure. Hitting on right rear side by an approaching truck.

Table - 4 (continued)

1982 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		ROLL OVER	FAILURE MECHANISM					REMARKS
	model	year		hinge broke / torn	latch pop out	striker pull out	anchor door loose / torn	A/B post twist/ buckle off	
Ford	Maverick	74	Y	-	-	-	-	-	Suspect latch failure, hitting guardrail caused the door to spring open.
Toyota	Celica	75	N	X	X	-	X	-	Suspect latch/hinge fail- ure. Left door latch torn loose and detached at hinge. 2 cars involved.
Plymouth	Duster	72	H	-	-	-	-	-	Suspect latch failure, rear-end impact by front of another car, then hit a ditch. Door intact, panels slightly dented.
Dodge	Coronet	69	N	-	X	-	-	-	Suspect latch failure, latch pulled out from B- pillar, 2 cars involved.
Olas.	Cutlass Supreme Brougham	77	N	-	-	-	-	-	Suspect latch failure, hit on the left rear side by car coming from left.

Table - 4 (continued)

1983 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		ROLL OVER	FAILURE MECHANISM							REMARKS		
	model	year		bodytype	hinge broke /torn	latch pop out	striker pull out	door anchor loose /torn	door buckle torn off	A/B post twist/ buckle off		A/B post side rip off	
Ford	Granada	76	N	4-dr SD	-	-	X	-	-	-	X	-	Right front door latch failure, B-pillar disengaged from frame, striker separated with the lock.
Chev.	Nova	76	N	2-dr SD	-	X	-	-	-	-	-	-	Minor impact at B-pillar/quarter panel & occupant striking door may have caused left door to open.
Ford	Pinto	72	Y	St. WG	-	X	-	-	-	-	-	-	Suspect left front door opened. Roof crushed to the belt-level hitting bridge parapet. Rear & left doors opened, right door jammed.
Mercury	Marquis	69	N	4-dr SD	-	-	-	-	-	X	-	-	Latch lock separated from striker. Left side hit a ditch/culvert. Damage severe.
Ford	Mustang	69	N	2-dr hardtop	-	X	-	-	-	-	-	-	Vehicle impacted guardrail. Suspect latch popped open. Damage nearby the locking mechanism.
Volks	Bug	67	Y	2-dr SD	-	X	-	-	-	-	-	-	Suspect left door latch popped open. Roof & window frame damaged.

Table - 4 (continued)

1983 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM						REMARKS	
	model	year			hinge broke /torn	latch pop out	striker pull out	anchor loose /torn	door buckle torn /crush off	A/B post twist/ torn off		side post rip off
Toyota	Corolla	72	2-dr SD	Y	-	X	-	-	-	-	-	Suspect latch popped open during accident. Left front door opened during event.
Pontiac	Grand Prix	76	2-dr SD	Y	-	-	-	-	-	-	-	Suspect latch failure caused the door to spring open, hitting a utility pole. Vehicle then went over a barbed wire fence.
Chev.	Nova	70	4-dr SD	N	-	-	-	-	X	-	-	Suspect latch failure. Left front door opened, bent & dented, after hitting trees and another vehicle.
Datsun	280Z	76	3/2 dr HB	Y	-	X	-	-	-	X	-	Suspect latch failure. Lock broke and door came ajar, hitting a sign post, deeply denting B-pillar.
Chev.	Camaro	74	2-dr SD	N	-	-	-	-	-	X	-	Suspect latch failure. Right door dented & opened & right A-pillar swept back by the frontal impact.
Mercedes	250SL	69	2-dr SD	N	X	-	X	X	-	X	-	Suspect latch/hinge failure after hitting a curb. Rust and age weakened the car and door mechanism.

Table - 4 (continued)

1983 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		ROLL OVER	FAILURE MECHANISM					REMARKS
	model	year		hinge broke /torn	latch pop out	striker pull out	anchor door /torn	door twist/ buckle off	
Buick	Invicta	59	N	-	-	X	-	-	Suspect latch failure. Striker was torn off.
Olds	Cutlass	73	N	-	-	-	-	-	Suspect latch failure. Left door sprang open & window broke after hitting rocks.
Pontiac	Grand Prix	75	N	-	X	-	X	-	Suspect latch failure. Left door hit by oncoming bus, damaging latch, opening door.
Volks	Beetle	65	N	-	-	-	-	-	Suspect latch failure.
Chev.	Impala	72	N	-	-	-	-	-	Suspect latch failure. Hit on rear end by other car.
Mercury	Monarch	77	N	X	-	-	-	X	Suspect latch/hinge failure Front door thrown open and pulled out, A-pillar tilted backward, hinge damaged due to impact to right front panel.
Ford	Pinto	76	N	-	-	-	-	-	Suspect latch failure. Front panel separated, hitting parked car.

Table - 4 (continued)

1983 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM							REMARKS	
	model	year			hinge broke /torn	latch pop out	striker pull out	anchor loose /torn	door buckle crush	A/B post twist/ torn off	door buckle torn off		
Olds	Cutlass	68	Convertible	N	-	-	X	-	-	-	-	-	Suspect latch failure. Left door bent & open, car went off the road, skidded sideways, hit mailbox & electric junction box.
Chev.	Monte Carlo	77	2-dr SD	N	-	-	-	-	-	-	-	-	Suspect latch failure and front impact caused door to spring open, hitting a pickup head-on. Front crushed.
Plymouth	Volare	76	2-dr SD	Y	-	-	-	-	-	-	X	-	Suspect latch failure, door opened & dented, A-pillar crushed along with roof.
Olds	Cutlass	72	2-dr SD	N	X	X	-	-	-	-	X	-	Latch broke loose, door broke away from B-pillar and bent inward. B-pillar dented & hinge damaged.
Ford	Galaxie	71	3/2 dr HB	N	-	-	-	-	X	-	-	-	Suspect latch failure. Hit curb, bridge rail & tree. Suspect door sprang open, it is bent and dented.
Ford	Maverick	76	4-dr SD	N	-	-	-	-	-	-	-	-	Suspect latch failure. Hit culvert. Left rear door dented, but in line and closed.

Table - 4 (continued)

1984 EJECTION CASES FOR MODEL YEAR BEFORE 78											
make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM					REMARKS	
	model	year			hinge broke /torn out	latch pop out	striker pull out	door anchor loose /torn /crush off	door A/B post twist/ buckle off		A/B post side rip off
Ford	Gran Torino	72	2-dr SD	N	-	-	-	-	X	-	Door severed after impact with a ditch pipe, tree & sign.
Ford	Pinto	73	2-dr SD	Y	-	-	X	-	-	X	Car skidded sideways into median, striking big tree. B-post/door weakened due to car overturn.
AMC	Hornet	74	SW	N	-	-	-	-	-	-	Latch failure, collided with a train.
Ford	Mustang	65	2-dr HT	Y	-	X	-	-	-	-	Latch popped open, car rolled into side ditch.
Chrysler	New Yorker	65	4-dr SD	N	-	X	-	-	-	X	Two car & one van accident tore off front structure. Severe damage to left rear and side structure.
Dodge	Dart	71	2-dr SD	N	-	-	X	-	X	-	Collided side-by-side with single-unit, straight truck, then overturned into trees. Door buckled, lock disengaged from striker.
Olds	98	75	2-dr SD	N	-	-	-	-	-	-	Suspect latch failure. Front-end impact with on-coming car.

Table - 4 (continued)

1984 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM				REMARKS
	model	year			hinge latch broke pop /torn out	striker anchor pull loose /torn/crush	door A/B post twist/ torn off	A/B post side rip off	
Ford	Galaxie	68	2-dr SD	N	-	-	X	-	Struck several trees, door bent and open.
Datsun	240Z	71	3/2-dr HB	N	-	-	-	-	Collision of 2 cars making a left turn at same time. Hit sign post and iron pipe. Suspect latch failure.
Ford	Torino	71	2-dr SD	N	X	-	-	-	Collided with a truck, then a bus. Damage to all parts of car. Suspect latch failure.
Volks	Bug	64	2-dr SD	N	-	-	-	-	Collided with 2 cars. Suspect latch failed.
Buick	LeSabre	64	4-dr SD	N	X	-	-	-	Suspect hinge failure, hitting utility pole. Both right doors detached.
Toyota	Corona 1900	69	2-dr SD	N	X	X	-	-	Hinge/latch damaged, right door is missing, right rear panel is buckled inward.
Mercury	Marquis	73	4-dr SD	Y	-	-	-	-	Collided with oncoming train and turned over. Suspect latch failure.
Olds	Delta 88 Royale	76	2-dr SD	N	-	-	-	-	Suspect latch failure.

Table - 4 (continued)

1984 EJECTION CASES FOR MODEL YEAR BEFORE 78										
VEHICLE			bodytype	ROLL OVER	FAILURE MECHANISM				REMARKS	
make	model	year			hinge broke /torn	latch pop out	striker pull out	door anchor loose /torn		A/B post twist/ off buckle
Pontiac	Catalina	72	4-dr SD	N	-	-	-	X	-	Hit oncoming truck, then a tree. Right side is badly distorted.
Mercury	Comet	63	4-dr SD	N	-	-	X	-	-	Collided with oncoming car. Door open, striker torn off, left front panel crushed. Suspect latch failure.
Chev.	Nova	69	2-dr SD	N	-	-	-	-	-	Suspect door latch failure. Collided with another car.
Chev.	Vega	75	Sta. WG	Y	-	-	-	-	-	Suspect latch failure, both doors jammed & would not open.
Chev.	Nova	72	2-dr SD	N	-	-	-	-	-	Suspect latch failure, door sprang open after hitting a sign post.
Buick	GS 400	67	2-dr SD	N	-	-	-	X	-	Collision with another car caused the door to open.
Chev.	Monte Carlo	74	2-dr SD	N	-	-	-	-	-	Hit a pedestrian. Suspect latch failure.
Chev.	Vega	74	2-dr HB	N	-	-	-	-	X	Collided with another car, left front door opened. Suspect latch failure.

Table - 4 (continued)

1984 EJECTION CASES FOR MODEL YEAR BEFORE 78

make	VEHICLE		bodytype	ROLL OVER	FAILURE MECHANISM					REMARKS
	model	year			hinge latch broke pop /torn out	striker pull out	anchor door loose buckle /torn /crush	door A/B post torn twist/ off buckle	A/B post side rip torn off	
Plymouth	Duster	73	2-dr SD	N	-	-	-	-	-	Suspect latch failure. Collided with a pickup.
Ford	Futura	67	2-dr SD	Y	-	-	-	-	-	Suspect latch failure. Car swerved sideways off to the right and overturned, left door opened.
Volks	Bug	64	2-dr SD	Y	X	-	-	X	-	Suspect latch/hinge failure Car overturned. Both doors held on by upper hinge.
Ford	Falcon	63	St. WG	Y	-	-	-	X	-	Door sprung and crushed during vehicle's overturn. Suspect latch failure.
Olds	Delta 88	71	2-dr SD	N	-	-	X	-	-	Collided with approaching car, suspect latch failure due to left front door opening.

fact to blame. Yet another problem is that in many cases the sequence of the event was not clearly described or known, so that one could not precisely determine how and by what object the doors were impacted. For these types of inquiries, the hard copy study did not give enough information.

2.4.5 Determination of Ejection Rates

The merged FARS - POLK files were grouped by the vehicle models years, and the ejection rate can be determined simply by dividing the POLK fleet population data for each model into the corresponding ejection counts attributed to that model vehicles. The unit of the ejection rate was ejections per million car-year exposure of a certain model.

One difficulty that had arisen during the rate calculation was the lack of 1981 and 1982 fleet data. Although the POLK data was available for the other two years (1981 and 1982), they are not stored in the NIH computer. Manual processing of this data or development of an automated file for these two years was considered to be beyond the scope of the present contract and too time consuming. Another difficulty was the omission of ejection data for certain years. It was proposed and approved by the CTM that the following criteria would be used to obviate these deficiencies:

- When the ejection count for one year was missing, total ejections for the other two years were summed and the 1983 fleet populations were doubled;

- If two ejection totals were missing, the remaining year ejection count was taken as the overall total, and the 1983 POLK data was used as the total fleet population, and

- When total ejections for all three years were present, the totals were simply summed and the fleet population for 1983 tripled.

The assumption of using the same value for the fleet populations for each of the years 1983, 1982, and 1981 has been explained previously in Section 2.3.4. The assumption with regard to missing ejection totals for one or two years was to use the average ejection rate for the remaining years as the appropriate ejection rate.

2.4.6 Ejection Rate Analysis

The ejection rates for different makes/models are arranged in descending order, for each calendar year in question. Table 5 shows the ejection rates for the calendar year 1983, Table 6 shows the ejection rates for the combination year 1982-1983 and Table 7, for the years 1981 through 1983.

A review of the rankings of model ejection rates reveals a clear dichotomy between foreign and domestic makes. Foreign models dominate the higher ranks. At the top of the list are Subaru, Renault, Saab, Mazda, Datsun, and Peugeot. Conversely, models exhibiting low ejection rates are almost entirely domestic.

On the basis of a generally accepted premise that ejection is dangerous to occupants, one may easily be tempted to conclude that the domestic cars are safer in a collision than the foreign makes. However, in light of the current data limitations, a more detailed study is needed before such a conclusion is fully warranted.

A review of POLK data revealed that a number of the model year vehicles, such as the Subaru 32 (Star), have a very low fleet population. Any sizeable ejection counts of these vehicles would produce abnor-

Table - 5. FATAL ACCIDENT EJECTION RATES
PASSENGER
NONSPORT MODEL CARS
YEAR 1983

MAKE	MODEL	ELECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
SUBARU	32	23	4576	5026
RENAULT	33	2	1780	1124
SUBARU	43	3	2747	1092
RENAULT	36	1	2937	340
DATSUN	40	2	6114	327
PEUGEOT	35	2	6248	320
MAZDA	32	11	40932	269
MAZDA	36	1	4400	227
FIAT	35	16	83955	191
AMERICAN MOTORS	1	5	28051	178
TOYOTA	39	10	59674	168
MAZDA	39	2	12217	164
DODGE	5	10	61222	163
DATSUN	36	59	373178	158
JAGUAR	33	1	6838	146
FORD	15	2	15213	131
RENAULT	31	13	99920	130
AUDI	33	14	111150	125
AMERICAN MOTORS	6	7	57247	122
BMW	35	19	156266	122
OLDSMOBILE	12	12	100596	119
BMW	36	5	42193	119
FIAT	33	2	25219	119
SAAB	31	16	135751	118
FORD	3	229	1949526	117
MERCURY	3	28	238851	117
MERCURY	9	21	182536	115
DATSUN	44	4	35203	114
DATSUN	33	138	1224555	113
SUBARU	31	85	771703	110
MAZDA	35	35	336914	104
DODGE	14	2	19616	102
FORD	32	27	265291	102
DATSUN	43	23	227609	101
TOYOTA	33	108	1072508	101
FORD	13	81	808712	100
RENAULT	37	2	20301	99
MERCURY	31	24	244888	98
MERCURY	8	26	270316	96
FIAT	37	3	31560	95
AUDI	32	7	75341	93
PLYMOUTH	2	37	404124	92
FORD	9	169	1838142	92
BUICK	12	18	195582	92
BUICK	31	3	34622	87
PEUGEOT	34	7	81054	86
DODGE	12	4	47312	85
PLYMOUTH	8	50	605532	83
PONTIAC	11	8	96386	83
FIAT	31	3	36541	82

Table - 5 (cont)

FATAL ACCIDENT EJECTION RATES
PASSENGER
NONSPORT MODEL CARS
YEAR 1983

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
HONDA	34	1	12252	82
HONDA	33	14	171792	81
VOLKSWAGEN	31	5	62427	80
CHRYSLER	14	2	25161	77
TOYOTA	34	8	101767	77
PONTIAC	10	111	1430458	73
DODGE	1	76	985953	77
PONTIAC	13	9	118001	76
HONDA	31	81	1070790	76
TOYOTA	32	148	1959527	76
VOLKSWAGEN	36	85	1129786	75
DODGE	33	10	136114	73
DODGE	8	37	516417	72
DODGE	11	23	323670	71
CHEVROLET	13	132	1851519	71
FORD	8	77	1076203	70
CHEVROLET	8	142	2061462	69
DATSUN	37	7	102161	67
PLYMOUTH	1	79	1183568	67
BMW	37	1	14834	67
VOLKSWAGEN	33	20	304536	66
MERCURY	13	15	236053	66
VOLKSWAGEN	32	68	1067201	66
CHEVROLET	10	156	2506970	62
AMERICAN MOTORS	7	36	594340	61
AMERICAN MOTORS	8	31	510228	61
DODGE	2	39	650399	60
MERCURY	10	18	298296	60
FORD	1	3	51988	58
DATSUN	35	16	277641	58
TOYOTA	38	25	432140	58
CHEVROLET	15	60	1103777	54
DATSUN	42	5	91960	54
DODGE	34	31	584653	53
FORD	12	68	1315927	52
MERCURY	12	21	401141	52
BUICK	8	4	76423	52
CHEVROLET	1	166	3205933	52
FORD	10	65	1265854	51
DATSUN	38	6	116658	51
TOYOTA	31	26	521909	50
CHRYSLER	9	31	635245	49
FORD	4	62	1271041	49
PONTIAC	12	20	407461	49
PONTIAC	16	7	142384	49
AMERICAN MOTORS	2	11	229352	48
DODGE	7	10	213237	47
PLYMOUTH	3	34	742229	46
PLYMOUTH	4	7	156923	45
DATSUN	39	8	176336	45
DODGE	6	32	722603	44

Table - 5 (cont) FATAL ACCIDENT EJECTION RATES
PASSENGER
NONSPORT MODEL CARS
YEAR 1983

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
FORD	6	155	3511410	44
TOYOTA	37	1	22706	44
FORD	11	66	1536886	43
CHEVROLET	11	31	719067	43
OLDSMOBILE	1	201	4652848	43
BMW	31	1	23262	43
DODGE	9	2	47594	42
BUICK	1	96	2368609	41
CHEVROLET	16	12	294126	41
OLDSMOBILE	16	2	48989	41
BUICK	5	14	351659	40
VOLKSWAGEN	34	9	222315	40
MERCEDES-BENZ	33	3	74155	40
CHRYSLER	10	38	968661	39
PLYMOUTH	11	16	414214	39
VOLVO	34	14	357555	39
PONTIAC	15	14	370566	38
VOLKSWAGEN	37	7	190603	37
HONDA	32	36	969112	37
MAZDA	37	8	224605	36
AMERICAN MOTORS	4	7	202616	35
LINCOLN	2	18	519694	35
CHEVROLET	2	184	5299511	35
PONTIAC	8	11	315460	35
AMERICAN MOTORS	3	3	87252	34
CHRYSLER	7	17	504030	34
CADILLAC	5	17	493028	34
PONTIAC	17	3	90471	33
MERCURY	11	14	435150	32
MERCEDES-BENZ	31	10	321373	31
OLDSMOBILE	2	61	2065370	30
FORD	2	5	169987	29
BUICK	3	33	1123242	29
DODGE	4	1	36114	28
DATSUN	31	2	71431	28
VOLVO	35	2	74156	27
BUICK	2	41	1592052	26
CADILLAC	3	50	1907254	26
OLDSMOBILE	3	25	1019473	25
LINCOLN	11	1	42277	24
BUICK	15	28	1172404	24
VOLVO	32	4	166320	24
AMERICAN MOTORS	9	3	131234	23
DODGE	3	9	389676	23
PLYMOUTH	6	22	947556	23
OLDSMOBILE	15	13	576450	23
DODGE	10	1	45568	22
OLDSMOBILE	5	7	312107	22
PONTIAC	2	38	1796794	21
JAGUAR	32	1	47044	21
MERCURY	6	21	1078127	19

Table - 5 (continued)

FATAL ACCIDENT EJECTION RATES
PASSENGER
NONSPORT MODEL CARS
YEAR 1983

MAKE	MODEL	ELECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
BUICK	34	1	52880	19
CHEVROLET	17	3	164644	18
VOLKSWAGEN	40	1	64644	15
AUDI	34	1	68227	15
LINCOLN	1	7	495401	14
FORD	5	4	346844	12
MERCEDES-BENZ	37	1	109341	9
TOYOTA	35	1	114647	9
CADILAC	14	2	275689	7
BUICK	10	1	352470	3

Table - 6
FATAL ACCIDENT EJECTION RATES
PASSENGER
NONSPORT MODEL CARS
YEAR 82&83

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
SUBARU	32	37	9152	4043
RENAULT	33	2	1780	1124
SAAB	32	4	4401	909
SUBARU	43	4	5494	728
MAZDA	36	4	8800	455
RENAULT	36	2	5874	340
DATSUN	40	2	6114	327
PEUGEOT	35	2	6248	320
FIAT	33	15	50438	297
BMW	34	2	7233	277
FIAT	35	40	167910	238
TOYOTA	36	1	4871	205
AMERICAN MOTORS	1	11	56102	196
RENAULT	31	34	199840	170
MAZDA	38	3	18083	166
MAZDA	39	2	12217	164
DODGE	5	20	122444	163
HONDA	34	4	24504	163
MAZDA	32	13	81864	159
JAGUAR	33	1	6838	146
FORD	1	15	103976	144
AMERICAN MOTORS	6	16	114494	140
AUDI	33	30	222300	135
FORD	15	2	15213	131
BMW	35	40	312532	128
MERCURY	31	62	489776	127
SAAB	31	34	271502	125
MERCURY	3	59	477702	124
DATSUN	33	293	2449110	120
BMW	36	10	84386	119
TOYOTA	39	14	119348	117
BUICK	31	8	69244	116
FORD	3	443	3899052	114
DATSUN	44	4	35203	114
TOYOTA	33	243	2145016	113
TOYOTA	34	23	203534	113
DATSUN	36	82	746356	110
DODGE	33	29	272228	107
AUSTIN/AUSTIN HEALEY	31	1	9329	107
FORD	32	56	530582	106
VOLKSWAGEN	31	13	124854	104
DODGE	14	2	19616	102
PLYMOUTH	2	81	808248	100
SUBARU	31	155	1543406	100
MERCURY	8	53	540632	98
BUICK	8	15	152846	98
DATSUN	31	14	142862	98
BUICK	33	3	31027	97
FIAT	37	3	31560	95
MAZDA	35	64	673828	95

Table - 6 (cont)

FATAL ACCIDENT EJECTION RATES
PASSENGER
NONSPORT MODEL CARS
YEAR 82&83

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
HONDA	33	32	343584	93
FORD	9	331	3676284	90
MERCURY	13	42	472106	89
PONTIAC	11	17	192772	88
FORD	13	133	1617424	82
FIAT	31	3	36541	82
ISUZU	31	3	36699	82
AUDI	32	12	150682	80
CHRYSLER	14	2	25161	79
PLYMOUTH	8	96	1211064	79
BUICK	12	31	391164	79
FORD	8	171	2192406	78
DATSUN	37	16	204322	73
MERCURY	9	28	365072	77
DATSUN	35	43	555282	77
DATSUN	38	18	233316	77
OLDSMOBILE	12	15	201192	75
PONTIAC	10	214	2860916	75
TOYOTA	32	295	3919054	75
RENAULT	37	3	40602	74
DODGE	2	95	1300798	73
CHEVROLET	8	300	4122924	73
HONDA	31	157	2141580	73
DODGE	8	73	1032834	71
VOLKSWAGEN	32	151	2134402	71
MERCEDES-BENZ	35	1	14041	71
DODGE	1	139	1971906	70
CHEVROLET	10	350	5013940	70
CHEVROLET	13	254	3703038	69
PLYMOUTH	1	161	2367136	68
PONTIAC	13	16	236002	68
AMERICAN MOTORS	8	68	1020456	67
BMW	37	1	14834	67
TOYOTA	37	3	45412	66
AMERICAN MOTORS	7	76	1188680	64
MERCURY	10	38	596592	64
BMW	31	3	46524	64
VOLKSWAGEN	37	24	381206	63
DATSUN	43	28	455218	62
TOYOTA	38	54	864280	62
DATSUN	42	11	183920	60
VOLVO	32	20	332640	60
AMERICAN MOTORS	2	27	458704	59
VOLKSWAGEN	36	134	2259572	59
TOYOTA	31	62	1043818	59
CHEVROLET	1	360	6411866	56
DODGE	10	5	91136	55
FORD	10	140	2531708	55
DODGE	11	35	647340	54
DODGE	34	63	1169306	54
CHEVROLET	11	78	1438134	54

Table - 6 (cont)

FATAL ACCIDENT EJECTION RATES

PASSENGER

NONSPORT MODEL CARS

YEAR 82&83

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
PONTIAC	8	34	630920	54
DODGE	9	5	95188	53
DODGE	12	5	94624	53
VOLKSWAGEN	33	32	609072	53
MERCURY	12	42	802282	52
VOLKSWAGEN	34	23	444630	52
PLYMOUTH	3	75	1484458	51
FORD	12	133	2631854	51
FORD	2	17	339974	50
PEUGEOT	34	8	162108	49
CHRYSLER	9	61	1270490	48
DATSUN	39	17	352672	48
VOLVO	34	34	715110	48
FORD	4	120	2542082	47
BUICK	34	5	105760	47
OLDSMOBILE	1	438	9305696	47
MAZDA	37	21	449210	47
CHEVROLET	15	100	2207554	45
PONTIAC	15	33	741132	45
AUDI	34	6	136454	44
FORD	6	303	7022820	43
PONTIAC	16	12	284768	42
BUICK	5	29	703318	41
OLDSMOBILE	16	2	48989	41
DODGE	3	31	779352	40
PONTIAC	12	33	814922	40
MERCEDES-BENZ	33	6	148310	40
VOLVO	35	6	148312	40
FORD	11	121	3073772	39
BUICK	1	184	4737218	39
MERCURY	11	33	870300	38
HONDA	32	74	1938224	38
AMERICAN MOTORS	4	15	405232	37
CHRYSLER	10	72	1937322	37
DODGE	6	53	1445206	37
DODGE	7	15	426474	35
CHEVROLET	2	371	10599022	35
AMERICAN MOTORS	3	6	174504	34
VOLVO	33	2	59637	34
PONTIAC	17	3	90471	33
PLYMOUTH	6	60	1895112	32
BUICK	3	72	2246484	32
MERCEDES-BENZ	37	7	218682	32
OLDSMOBILE	2	126	4130740	31
LINCOLN	2	31	1039388	30
OLDSMOBILE	5	19	624214	30
DODGE	4	2	72228	28
PLYMOUTH	11	23	828428	28
AMERICAN MOTORS	9	7	262468	27
CHRYSLER	7	27	1008060	27
FORD	7	1	37532	27

Table - 6 (cont)

FATAL ACCIDENT EJECTION RATES
PASSENGER
NONSPORT MODEL CARS
YEAR 82&83

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
CADILLAC	5	27	986056	27
OLDSMOBILE	3	55	2038946	27
BUICK	2	83	3184104	26
PONTIAC	2	94	3593588	26
IMPERIAL	10	1	39699	25
PLYMOUTH	4	8	313846	25
CADILLAC	3	95	3814508	25
CADILLAC	14	14	551378	25
CHEVROLET	16	15	588252	25
OLDSMOBILE	15	29	1152900	25
LINCOLN	11	1	42277	24
BUICK	15	57	2344808	24
LINCOLN	1	23	990802	23
MERCEDES-BENZ	31	14	642746	22
JAGUAR	32	2	94088	21
FORD	5	14	693688	20
MERCURY	6	38	2156254	18
CHEVROLET	17	3	164644	18
TOYOTA	35	4	229294	17
VOLKSWAGEN	40	2	129288	15
BUICK	10	2	704940	3

Table - 7. FATAL ACCIDENT EJECTION RATES
PASSENGER
NONSPORT MODEL CARS
YEAR 81,82 & 83

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
SUBARU	32	37	9152	4043
RENAULT	33	2	1780	1124
SAAB	32	4	4401	909
SUBARU	43	4	5494	728
MAZDA	36	4	8800	455
RENAULT	36	2	5874	340
DATSUN	40	2	6114	327
PEUGEOT	35	2	6248	320
FIAT	33	15	50438	297
BMW	34	2	7233	277
AMERICAN MOTORS	1	20	84153	238
FIAT	35	40	167910	238
TOYOTA	36	1	4871	205
DODGE	5	33	183666	180
RENAULT	31	34	199840	170
MAZDA	38	3	18083	166
BUICK	31	17	103866	164
MAZDA	39	2	12217	164
HONDA	34	4	24504	163
FORD	7	12	75064	160
MAZDA	32	13	81864	159
FORD	1	23	155964	147
AMERICAN MOTORS	6	25	171741	146
JAGUAR	33	1	6838	146
AUDI	33	30	222300	135
FORD	15	2	15213	131
BMW	35	40	312532	128
SAAB	31	34	271502	125
MERCURY	3	89	716553	124
MERCURY	31	91	734664	124
DATSUN	33	293	2449110	120
BMW	36	10	84386	119
TOYOTA	39	14	119348	117
DATSUN	44	4	35203	114
TOYOTA	33	243	2145016	113
TOYOTA	34	23	203534	113
PLYMOUTH	2	135	1212372	111
DATSUN	36	82	746356	110
FORD	3	637	5848578	109
FORD	32	87	795873	109
AUSTIN/AUSTIN HEALEY	31	1	9329	107
VOLKSWAGEN	31	13	124854	104
DODGE	14	2	19616	102
SUBARU	31	155	1543406	100
DODGE	33	40	408342	98
FORD	9	541	5514426	98
DATSUN	31	14	142862	98
BUICK	33	6	62054	97
FIAT	37	3	31560	95
MAZDA	35	64	673828	95

Table - 7 (cont)

FATAL ACCIDENT EJECTION RATES

PASSENGER

NONSPORT MODEL CARS

YEAR 81, 82 & 83

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
HONDA	33	32	343584	93
DODGE	9	13	142782	91
MERCURY	8	73	810948	90
OLDSMOBILE	12	27	301788	89
MERCURY	9	48	547608	88
DODGE	2	164	1951197	84
BUICK	8	19	229269	83
FIAT	31	3	36541	82
ISUZU	31	3	36699	82
FORD	8	266	3288609	81
PLYMOUTH	8	146	1816596	80
CHEVROLET	8	496	6184386	80
AUDI	32	12	150682	80
AMERICAN MOTORS	8	121	1530684	79
CHRYSLER	14	2	25161	79
PONTIAC	10	338	4291374	79
DATSUN	37	16	204322	78
BUICK	12	45	586746	77
DATSUN	35	43	555282	77
DATSUN	38	18	233316	77
PONTIAC	11	22	289158	76
TOYOTA	32	295	3919054	75
CHEVROLET	10	555	7520910	74
RENAULT	37	3	40602	74
DODGE	1	216	2957859	73
DODGE	10	10	136704	73
HONDA	31	157	2141580	73
PLYMOUTH	1	254	3550704	72
VOLKSWAGEN	32	151	2134402	71
MERCEDES-BENZ	35	1	14041	71
MERCURY	13	49	708159	69
FORD	10	260	3797562	68
FORD	13	162	2426136	67
BMW	37	1	14834	67
DODGE	8	103	1549251	66
TOYOTA	37	3	45412	66
CHEVROLET	13	353	5554557	64
BMW	31	3	46524	64
DODGE	34	110	1753959	63
VOLKSWAGEN	37	24	381206	63
DATSUN	43	28	455218	62
TOYOTA	38	54	864280	62
AMERICAN MOTORS	2	42	688056	61
AMERICAN MOTORS	7	109	1783020	61
CHEVROLET	1	586	9617799	61
CHEVROLET	11	132	2157201	61
DATSUN	42	11	183920	60
VOLVO	32	20	332640	60
VOLKSWAGEN	36	134	2259572	59
TOYOTA	31	62	1043818	59
CHRYSLER	9	110	1905735	58

Table - 7 (cont)

FATAL ACCIDENT EJECTION RATES
PASSENGER
NONSPORT MODEL CARS
YEAR 81,82 & 83

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
FORD	2	29	509961	57
MERCURY	10	51	894888	57
PONTIAC	8	51	946380	54
AMERICAN MOTORS	3	14	261756	53
DODGE	12	5	94624	53
VOLKSWAGEN	33	32	609072	53
VOLKSWAGEN	34	23	444630	52
PLYMOUTH	4	24	470769	51
PLYMOUTH	3	109	2226687	49
PEUGEOT	34	8	162108	49
FORD	6	502	10534230	48
FORD	12	189	3947781	48
OLDSMOBILE	1	670	13958544	48
PONTIAC	13	17	354003	48
DATSUN	39	17	352672	48
VOLVO	34	34	715110	48
FORD	4	181	3813123	47
LINCOLN	11	4	84554	47
MAZDA	37	21	449210	47
DODGE	3	53	1169028	45
BUICK	34	7	158640	44
PONTIAC	12	54	1222383	44
AUDI	34	6	136454	44
DODGE	11	42	971010	43
MERCURY	12	52	1203423	43
PONTIAC	16	12	284768	42
CHEVROLET	15	136	3311331	41
OLDSMOBILE	16	2	48989	41
PONTIAC	15	46	1111698	41
FORD	11	183	4610658	40
MERCEDES-BENZ	33	6	148310	40
VOLVO	35	6	148312	40
IMPERIAL	10	3	79398	38
HONDA	32	74	1938224	38
DODGE	4	4	108342	37
BUICK	5	39	1054977	37
CHEVROLET	2	587	15898533	37
AMERICAN MOTORS	4	22	607848	36
DODGE	6	79	2167809	36
BUICK	1	254	7105827	36
CHRYSLER	10	102	2905983	35
MERCURY	11	46	1305450	35
OLDSMOBILE	5	32	936321	34
VOLVO	33	2	59637	34
AMERICAN MOTORS	9	13	393702	33
PLYMOUTH	6	94	2842668	33
PONTIAC	17	3	90471	33
OLDSMOBILE	2	196	6196110	32
MERCEDES-BENZ	37	7	218682	32
DODGE	7	20	639711	31
LINCOLN	2	48	1559082	31

Table - 7 (cont)

FATAL ACCIDENT EJECTION RATES

PASSENGER

NONSPORT MODEL CARS

YEAR 81,82 & 83

MAKE	MODEL	EJECTIONS	TOTALS	EJECTIONS PER MILLION VEHICLES
BUICK	3	104	3369726	31
PONTIAC	2	167	5390382	31
CADILLAC	5	41	1479084	28
CHRYSLER	7	41	1512090	27
CADILLAC	3	152	5721762	27
CADILLAC	14	22	827067	27
OLDSMOBILE	15	47	1729350	27
OLDSMOBILE	3	78	3058419	26
PLYMOUTH	11	30	1242642	24
BUICK	2	113	4776156	24
LINCOLN	1	36	1486203	24
MERCEDES-BENZ	31	14	642746	22
BUICK	15	75	3517212	21
JAGUAR	32	2	94088	21
MERCURY	6	66	3234381	20
CHEVROLET	16	18	882378	20
FORD	5	20	1040532	19
CHEVROLET	17	3	164644	18
TOYOTA	35	4	229294	17
VOLKSWAGEN	40	2	129288	15
BUICK	10	2	704940	3

mally high ejection rates. Moreover, several small populations producing high ejection rates would inflate the average for all models and make representative sample selection from high, average and low groups problematic. As shown in Table 8, the results do have significantly higher ejection rates which undoubtedly affects the mean 119.41. Against a median of 66, a very skewed distribution ejection results. Ideally, some type of scaling would be performed to adjust smaller populations before calculating ejection rates. Without the necessary data to make such an adjustment, 28 models with actual exposure of less than 50,000 car-years were omitted. The ejection rates of remaining vehicles are shown in Table 9. It is shown that the distribution was much more even.

Ejection rates based on FARS/POLK 1981-1983 data were first grouped according to Thirteen (13) rate intervals (Table 9) to identify the median class and facilitate statistical inference. Using a standard SAS procedure, the mean, variance and the other measures of dispersion, or moments, were computed. The mean rate was 69.76 ejections per million car-years.

It is interesting to determine the type of statistical distribution exhibited by FARS ejection rates. The results indicated that the ejections, as expected, follow the Poisson distribution, indicating the relatively rare occurrence of such events among the total vehicle population. Model deviations defined as square root of ejections per million car-years (or $S1 = \sqrt{n}/N \times \text{million}$), were then computed for passenger cars (Table 10) to measure the expected fluctuations in individual ejection rates. Companion deviations based on weighted population [or $s2 = (n/N) \times (1/\sqrt{N}) \times \text{million}$] were also determined (where n denotes total ejections and N denotes the total fleet population).

Table - 8

FREQUENCY DISTRIBUTION EJECTION RATE
FOR YEAR 81,82,83
NONSPORT PASSENGER CAR
ENTIRE POPULATION

EJECTION RATES				
EJECTRATE	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
700 - 5000	4	4	2.312	2.312
200 - 699	9	13	5.202	7.514
150 - 199	8	21	4.624	12.138
120 - 149	10	31	5.780	17.918
100 - 119	13	44	7.514	25.432
80 - 99	19	63	10.983	36.415
70 - 79	17	80	9.827	46.242
60 - 69	18	98	10.405	56.647
50 - 59	11	109	6.358	63.005
40 - 49	24	133	13.873	76.878
30 - 39	21	154	12.139	89.017
20 - 29	14	168	8.092	97.110
0 - 19	5	173	2.890	100.000

STATISTICS OF EJECTION RATES
FOR YEAR 81,82,83
NONSPORT PASSENGER CAR
ENTIRE POPULATION

				UNIVARIATE					
VARIABLE=EJCTRATE						EXTREMES			
MOMENTS				QUANTILES(DEF=4)		LOWEST HIGHEST			
N	173	SUM WGTs	173	100% MAX	4043	99%	1882.88	3	455
MEAN	119.41	SUM	20658	75% Q3	103	95%	303.9	15	728
STD DEV	326.836	VARIANCE	106822	50% MED	66	90%	165.2	17	909
SKEWNESS	10.4732	KURTOSIS	122.811	25% Q1	41	10%	27.4	18	1124
USS	20840172	CSS	18373392	0% MIN	3	5%	213	19	4043
CV	273.708	STD MEAN	24.8489			1%	11.88		
T:MEAN=0	4.80546	PROB>IT1	0.0001	RANGE	4040				
SGN RANK	7525.5	PROB>ISI	0.0001	Q3-Q1	62				
SUM = 0	173			MODE	48				

Table - 9

FREQUENCY DISTRIBUTION EJECTION RATE
FOR YEAR 81,82,83
NONSPOUT PASSENGER CAR
POPULATION >= 50,000

EJECTRATE	EJECTION RATES			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
200 - 699	3	3	2.069	2.069
150 - 199	5	8	3.448	5.517
120 - 149	8	16	5.517	11.034
100 - 119	10	26	6.897	17.931
80 - 99	16	42	11.034	28.965
70 - 79	14	56	9.655	38.620
60 - 69	15	71	10.345	48.965
50 - 59	11	82	7.586	56.551
40 - 49	23	105	15.862	72.413
30 - 39	21	126	14.483	86.896
20 - 29	14	140	9.655	96.552
0 - 19	5	145	3.448	100.000

STATISTICS OF EJECTION RATES
FOR YEAR 81,82,83
NONSPOUT PASSENGER CAR
POPULATION >=50,000

UNIVARIATE				EXTREMES					
VARIABLE=EJCTRATE									
MOMENTS				QUANTILES(DEF=4)				LOWEST	HIGHEST
N	145	SUM WGTs	145	100% MAX	297	99%	269.859	3	180
MEAN	69.7655	SUM	10116	75% Q3	88.5	95%	162.8	15	183
STD DEV	46.4	VARIANCE	2152.96	50% MED	59	90%	124.4	17	238
SKEWNESS	1.88279	KURTOSIS	5.07192	25% Q1	37	10%	27	18	238
USS	1015774	CSS	310026	0% MIN	3	5%	20.3	19	197
CV	66.5085	STD MEAN	3.85331			1%	8.51999		
T:MEAN=0	18.1054	PROB> T	0.0001	RANGE	294				
SGN RANK	5292.5	PROB> S	0.0001	Q3-Q1	51.5				
SUM = 0	145			MODE	48				

Table - 10.

FATAL ACCIDENT EJECTION RATES
NONSUPPORT PASSENGER CARS
YEAR 81,82 & 83

MAKE	MODEL	EJECTIONS	TOTAL 1983	TOTALS 818283	EJECTIONS PER MILLION CARS	DEVIATION PER MILLION	DEVIATION OF POPULATION
FIAT	33	15	0	50438	297	77	1
AMERICAN MOTORS	1	20	0	84153	238	53	1
FIAT	35	40	0	167910	238	38	1
DODGE	5	33	0	183666	180	31	0
RENAULT	31	34	5756	199840	170	29	0
BUICK	31	17	0	103866	164	40	1
FORD	7	12	0	75064	160	46	1
MAZDA	32	13	0	81864	159	44	1
FORD	1	23	0	155964	147	31	0
AMERICAN MOTORS	6	25	0	171741	146	29	0
AUDI	33	30	0	222300	135	25	0
BMW	35	40	21898	312532	128	20	0
SAAB	31	34	15392	271502	125	21	0
MERCURY	3	89	10687	716553	124	13	0
MERCURY	31	91	0	734664	124	13	0
DATSUN	33	293	0	2449110	120	7	0
BMW	36	10	2549	84386	119	37	0
TOYOTA	39	14	5631	119348	117	31	0
TOYOTA	33	243	73024	2145016	113	7	0
TOYOTA	34	23	17797	203534	113	24	0
PLYMOUTH	2	135	0	1212372	111	10	0
DATSUN	36	82	0	746356	110	12	0
FORD	3	637	61143	5848578	109	4	0
FORD	32	87	0	795873	109	12	0
VOLKSWAGEN	31	13	0	124854	104	29	0
SUBARU	31	155	69158	1543406	98	8	0
DODGE	33	40	14064	408342	98	15	0
FORD	9	541	0	5514426	98	4	0
DATSUN	31	14	0	142862	98	26	0
BUICK	33	6	0	62054	97	39	0
MAZDA	35	64	29440	673828	95	12	0
HONDA	33	32	10914	343584	93	16	0
DODGE	9	13	3648	142782	91	25	0
MERCURY	8	73	0	810948	90	11	0
OLDSMOBILE	12	27	0	301788	89	17	0
MERCURY	9	48	0	547608	88	13	0
DODGE	2	164	0	1951197	84	7	0
BUICK	8	19	0	229269	83	19	0
FORD	8	266	0	3288609	81	5	0
PLYMOUTH	8	146	51260	1816596	80	7	0
CHEVROLET	8	496	0	6184386	80	4	0
AUDI	32	12	0	150682	80	23	0
AMERICAN MOTORS	8	121	3425	1530684	79	7	0
PONTIAC	10	338	49534	4291374	79	4	0
DATSUN	37	16	0	204322	78	20	0
BUICK	12	45	38002	586746	77	11	0
DATSUN	35	43	0	555282	77	12	0
DATSUN	38	18	0	233316	76	18	0
PONTIAC	11	22	0	289158	76	16	0
TOYOTA	32	295	98410	3919054	75	4	0

Table - 10. (cont.) FATAL ACCIDENT EJECTION RATES
NONSPORT PASSENGER CARS
YEAR 81, 82 & 83

MAKE	MODEL	EJECTIONS	TOTAL 1983	TOTALS 818283	EJECTIONS PER MILLION CARS	DEVIATION PER MILLION	DEVIATION OF POPULATION
CHEVROLET	10	555	55069	7520910	74	3	0
DODGE	1	216	0	2957859	73	5	0
DODGE	10	10	0	136704	73	23	0
HONDA	31	157	88845	2141580	73	6	0
PLYMOUTH	1	254	0	3550704	72	4	0
VOLKSWAGEN	32	151	0	2134402	71	6	0
MERCURY	13	49	43494	708159	69	10	0
FORD	10	260	0	3797562	68	4	0
FORD	13	162	190788	2426136	67	5	0
DODGE	8	103	52438	1549251	66	7	0
CHEVROLET	13	353	87488	5554557	64	3	0
DODGE	34	110	31931	1753959	63	6	0
VOLKSWAGEN	37	24	0	381206	63	13	0
DATSUN	43	28	129707	455218	62	12	0
TOYOTA	38	54	100683	864280	62	9	0
AMERICAN MOTORS	2	42	0	688056	61	9	0
AMERICAN MOTORS	7	109	14134	1783020	61	6	0
CHEVROLET	1	586	63942	9617799	61	3	0
CHEVROLET	11	132	0	2157201	61	5	0
DATSUN	42	11	33324	183920	60	18	0
VOLVO	32	20	0	332640	60	13	0
VOLKSWAGEN	36	134	36677	2259572	59	5	0
TOYOTA	31	62	0	1043818	59	8	0
CHRYSLER	9	110	9779	1905735	58	6	0
FORD	2	29	0	509961	57	11	0
MERCURY	10	51	0	894888	57	8	0
PONTIAC	8	51	0	946380	54	8	0
AMERICAN MOTORS	3	14	0	261756	53	14	0
DODGE	12	5	16980	94624	53	24	0
VOLKSWAGEN	33	32	0	609072	53	9	0
VOLKSWAGEN	34	23	0	444630	52	11	0
PLYMOUTH	4	24	0	470769	51	10	0
PLYMOUTH	3	109	0	2226687	49	5	0
PEUGEOT	34	8	6653	162108	49	17	0
FORD	6	502	162862	10534230	48	2	0
FORD	12	189	56429	3947781	48	3	0
OLDSMOBILE	1	670	294402	13958544	48	2	0
PONTIAC	13	17	13151	354003	48	12	0
DATSUN	39	17	40163	352672	48	12	0
VOLVO	34	34	47666	715110	48	8	0
FORD	4	181	47069	3813123	47	4	0
LINCOLN	11	4	0	84554	47	24	0
MAZDA	37	21	29140	449210	47	10	0
DODGE	3	53	0	1169028	45	6	0
BUICK	34	7	0	158640	44	17	0
PONTIAC	12	54	0	1222383	44	6	0
AUDI	34	6	4995	136454	44	18	0
DODGE	11	42	74413	971010	43	7	0
MERCURY	12	52	18374	1203423	43	6	0
PONTIAC	16	12	41521	284768	42	12	0
CHEVROLET	15	136	51139	3311331	41	4	0

Table - 10. (cont.) FATAL ACCIDENT EJECTION RATES
NONSORT PASSENGER CARS
YEAR 81,82 & 83

MAKE	MODEL	EJECTIONS	TOTAL 1983	TOTALS 818283	EJECTIONS PER MILLION CARS	DEVIATION PER MILLION	DEVIATION OF POPULATION
PONTIAC	15	46	12542	1111698	41	6	0
FORD	11	183	0	4610658	40	3	0
MERCEDES-BENZ	33	6	6824	148310	40	17	0
VOLVO	35	6	0	148312	40	17	0
IMPERIAL	10	3	0	79398	38	22	0
HONDA	32	74	139606	1938224	38	4	0
DODGE	4	4	0	108342	37	18	0
BUICK	5	39	31148	1054977	37	6	0
CHEVROLET	2	587	135722	15898533	37	2	0
AMERICAN MOTORS	4	22	0	607848	36	8	0
DODGE	6	79	0	2167809	36	4	0
BUICK	1	254	0	7105827	36	2	0
CHRYSLER	10	102	72017	2905983	35	3	0
MERCURY	11	46	0	1305450	35	5	0
OLDSMOBILE	5	32	23728	936321	34	6	0
VOLVO	33	2	0	59637	34	24	0
AMERICAN MOTORS	9	13	21917	393702	33	9	0
PLYMOUTH	6	94	0	2842668	33	3	0
PONTIAC	17	3	37234	90471	33	19	0
OLDSMOBILE	2	196	146166	6196110	32	2	0
MERCEDES-BENZ	37	7	11174	218682	32	12	0
DODGE	7	20	12219	639711	31	7	0
LINCOLN	2	48	18101	1559082	31	4	0
BUICK	3	104	55758	3369726	31	3	0
PONTIAC	2	167	47092	5390382	31	2	0
CADILLAC	5	41	41572	1479084	28	4	0
CHRYSLER	7	41	46179	1512090	27	4	0
CADILLAC	3	152	86212	5721762	27	2	0
OLDSMOBILE	14	22	19236	827067	27	6	0
OLDSMOBILE	15	47	30983	1729350	27	4	0
OLDSMOBILE	3	78	75477	3058419	26	3	0
PLYMOUTH	11	30	94869	1242642	24	4	0
BUICK	2	113	85092	4776156	24	2	0
LINCOLN	1	36	33295	1486203	24	4	0
MERCEDES-BENZ	31	14	22235	642746	22	6	0
BUICK	15	75	63874	3517212	21	2	0
JAGUAR	32	2	6886	94088	21	15	0
MERCURY	6	66	101697	3234381	20	3	0
CHEVROLET	16	18	122435	882378	20	5	0
FORD	5	20	0	1040532	19	4	0
CHEVROLET	17	3	79368	164644	18	11	0
TOYOTA	35	4	24661	229294	17	9	0
VOLKSWAGEN	40	2	4433	129288	15	11	0
BUICK	10	2	145408	704940	3	2	0

Employing the same procedure used for passenger cars, FARS-based ejections rates were calculated for each Light Truck model in 1982 and 1983. Rates for 1983 models, shown in Table 11 (Vans), Table 12 (Pickups) and Table 13 (Other Light Trucks) were also expressed in ejections per million car-years. Ejection rates for 1982 were listed in Table 14 (Vans), Table 15 (Pickups) and Table 16 (Other Light Vehicles). Those tables list the ejection rates in descending order.

The NASS Light Truck data contained only a small number of ejection cases. The number of ejections for grouped NASS models Pickups, Vans and Other Light Vehicles are given in Tables 17, 18 and 19 for 1983, 1982 and 1981, respectively

3. TESTS

3.1 Background

This task intended to provide information to the question: "Is the ejection rate of any given vehicle related to the strength of its door-latches and/or hinges?" It was decided to test a number of representative latch/hinge samples of those model year vehicles that have high, average or low ejection rates. The procedures for such tests are specified in FMVSS No.206. However, the FMVSS No.206 test requires test specimens to sustain a load of a certain level, up to 2,000 lbs in transverse loading and 2,500 lbs in longitudinal loading. Figures 1 and 2 are shown the direction of the longitudinal and transverse load with respect to the position of the car for latch/hinge. In other words, it is a proof test. To determine the strength of a specimen, the maximum load must be determined. To do so, the standard test rig was not strong enough and it must be redesigned to safely

Table - 11. FATAL ACCIDENT EJECTION RATES FOR YEAR 1983
VANS

MAKE	MODEL	EJECTIONS	TOTAL	EJECTION PER MILLION CARS
CHEVROLET	11	1	5051	198
VOLKSWAGEN	74	46	351781	131
CHEVROLET	74	102	1280438	80
DODGE	74	94	1358365	69
GMC	74	17	246059	69
FORD	75	1	16475	61
GMC	75	2	34916	57
FORD	74	97	1777535	55
PLYMOUTH	71	1	31577	32
CHEVROLET	75	4	138333	29
CHEVROLET	79	1	45956	22
PLYMOUTH	74	1	80301	12
FORD	71	1	385157	3
CHEVROLET	73	6	6676995	1
FORD	73	1	6603853	0

Table - 12. FATAL ACCIDENT EJECTION RATES FOR YEAR 1983
PICKUPS

MAKE	MODEL	EJECTIONS	TOTAL	EJECTION PER MILLION CARS
VOLKSWAGEN	43	3	2459	1220
52	72	3	4356	689
FORD	77	39	167605	233
CHEVROLET	79	9	45956	196
GMC	77	11	59632	184
PLYMOUTH	72	7	44166	158
TOYOTA	72	143	942144	152
DODGE	72	20	133905	149
GMC	73	174	1529430	114
CHEVROLET	73	738	6676995	111
CHEVROLET	77	28	261459	107
DATSUN	72	92	890680	103
FORD	73	657	6603853	99
FORD	72	50	512370	98
CHEVROLET	72	36	489656	74
MAZDA	72	7	95975	73
ISUZU	72	2	35426	56
JEEP	73	7	134649	52
DODGE	13	1	19145	52
DODGE	73	66	1292569	51
FORD	7	7	181479	39
SUBARU	43	2	65189	31
GMC	7	1	50196	20
CHEVROLET	74	15	1280438	12
FORD	71	3	385157	8
INTERNAT HARV	71	2	242413	8
CHEVROLET	75	1	138333	7
JEEP	71	1	175537	6
JEEP	76	1	156238	6
CHEVROLET	7	2	497826	4
JEEP	2	1	479085	2
FORD	74	4	177535	2
DODGE	74	1	1358365	1

Table - 13. FATAL ACCIDENT EJECTION RATES FOR YEAR 1983
OTHER LIGHT TRUCKS

MAKE	MODEL	EJECTIONS	TOTAL	EJECTION PER MILLION CARS
JEEP	79	3	479	6263
JEEP	2	355	479085	741
FORD	70	6	14561	412
FORD	71	105	385157	273
INTERNAT HARV	71	48	242413	198
DODGE	71	16	94409	169
CHEVROLET	79	3	45956	65
JEEP	71	11	175537	63
GMC	71	5	88250	57
JEEP	76	8	156238	51
GMC	73	49	1529430	32
PLYMOUTH	72	1	44166	23
CHEVROLET	75	3	138333	22
CHEVROLET	73	137	6676995	21
CHEVROLET	70	1	94904	11
CHEVROLET	74	14	1280438	11
DODGE	72	1	133905	7
VOLKSWAGEN	74	2	351781	6
CHEVROLET	72	2	489656	4
CHEVROLET	77	1	261459	4
DATSUN	72	4	890680	4
TOYOTA	72	4	942144	4
CHEVROLET	71	1	451508	2
DODGE	73	1	1292569	1
FORD	73	8	6603853	1
FORD	74	2	1777535	1

Table - 14. FATAL ACCIDENT EJECTION RATES FOR YEAR 1982
VANS

MAKE	MODEL	EJECTIONS	TOTAL	EJECTION PER MILLION CARS
INTERNAT HARV	75	2	2080	962
PLYMOUTH	74	8	80301	100
VOLKSWAGEN	74	31	351781	88
CHEVROLET	79	4	45956	87
GMC	74	21	246059	85
CHEVROLET	74	100	1280438	78
DODGE	74	68	1358365	50
FORD	74	88	1777535	50
CHEVROLET	75	6	138333	43
DODGE	71	4	94409	42
FORD	72	1	512370	2
CHEVROLET	73	14	6676995	2
FORD	73	3	6603853	0

Table - 15. FATAL ACCIDENT EJECTION RATES FOR YEAR 1982
PICKUPS

MAKE	MODEL	EJECTIONS	TOTAL	EJECTION PER MILLION CARS
VOLKSWAGEN	43	1	2459	407
CHEVROLET	79	13	45956	283
DODGE	72	23	133905	172
CHEVROLET	73	859	6676995	129
TOYOTA	72	113	942144	120
FORD	72	59	512370	115
DATSUN	72	100	890680	112
GMC	73	163	1529430	107
FORD	73	585	6603853	89
CHEVROLET	72	42	489656	86
MAZDA	72	8	95975	83
DODGE	73	90	1292569	70
JEEP	73	9	134649	67
PLYMOUTH	71	2	31577	63
CHEVROLET	77	16	261459	61
GMC	75	2	34916	57
ISUZU	72	2	35426	56
DODGE	13	1	19145	52
PLYMOUTH	72	2	44166	45
GMC	7	2	50196	40
FORD	77	6	167605	36
DODGE	71	2	94409	21
GMC	77	1	59632	17
JEEP	2	7	479085	15
SUBARU	43	1	65189	15
CHEVROLET	7	6	497826	12
GMC	74	3	246059	12
FORD	71	3	385157	8
FORD	7	1	181479	6
FORD	74	3	177535	2
CHEVROLET	74	3	1280438	2

Table - 16. FATAL ACCIDENT EJECTION RATES FOR YEAR 1982
OTHER LIGHT TRUCKS

MAKE	MODEL	EJECTIONS	TOTAL	EJECTION PER MILLION CARS
JEEP	79	5	479	10438
JEEP	2	364	479085	760
FORD	71	77	385157	200
DODGE	71	14	94409	148
INTERNAT HARV	71	31	242413	128
VOLKSWAGEN	39	2	17243	116
JEEP	76	13	156238	83
JEEP	71	13	175537	74
DODGE	72	3	133905	22
CHEVROLET	79	1	45956	22
CHEVROLET	73	133	6676995	20
GMC	73	29	1529430	19
CHEVROLET	71	6	451508	13
GMC	71	1	88250	11
JEEP	73	1	134649	7
CHEVROLET	74	5	1280438	4
GMC	74	1	246059	4
DATSUN	72	3	890680	3
TOYOTA	72	3	942144	3
DODGE	73	1	1292569	1
FORD	74	1	177535	1
FORD	73	2	6603853	0

Table - 17

NASS LIGHT VEHICLE FOR YEAR 1983
(GVWR LESS THAN OR EQUAL 10,000LBS)

VANS

MAKE	MODEL	EJECTIONS
DODGE	74	2
FORD	74	4
CHEVROLET	74	5
VOLKSWAGEN	74	2

PICKUPS

MAKE	MODEL	EJECTIONS
DODGE	73	2
FORD	7	1
FORD	72	3
FORD	73	24
CHEVROLET	72	1
CHEVROLET	73	41
GMC	73	5
GMC	77	1
DATSUN	72	5
MAZDA	72	1
TOYOTA	72	4

OTHER LIGHT VEHICLE

MAKE	MODEL	EJECTIONS
JEEP	2	21
DODGE	71	5
FORD	71	9
CHEVROLET	71	5
GMC	71	1
TOYOTA	71	2

Table - 18

NASS LIGHT VEHICLE FOR YEAR 1982
(GVWR LESS THAN OR EQUAL 10,000LBS)

VANS

MAKE	MODEL	EJECTIONS
DODGE	74	1
FORD	74	8
CHEVROLET	74	4
GMC	74	2

PICKUPS

MAKE	MODEL	EJECTIONS
DODGE	72	1
DODGE	73	6
FORD	72	1
FORD	73	18
FORD	79	1
CHEVROLET	72	2
CHEVROLET	73	19
CHEVROLET	78	1
GMC	73	2
GMC	78	1
DATSUN	72	1
TOYOTA	72	1

OTHER LIGHT VEHICLE

MAKE	MODEL	EJECTIONS
JEEP	2	10
JEEP	71	2
CHEVROLET	71	5
CHEVROLET	76	1
TOYOTA	71	5
INT. HARVESTER	71	1
INT. HARVESTER	76	2

Table - 19

NASS LIGHT VEHICLE FOR YEAR 1981
(GVWR LESS THAN OR EQUAL 10,000LBS)

VANS

MAKE	MODEL	EJECTIONS
DODGE	74	3
CHEVROLET	74	5

PICKUPS

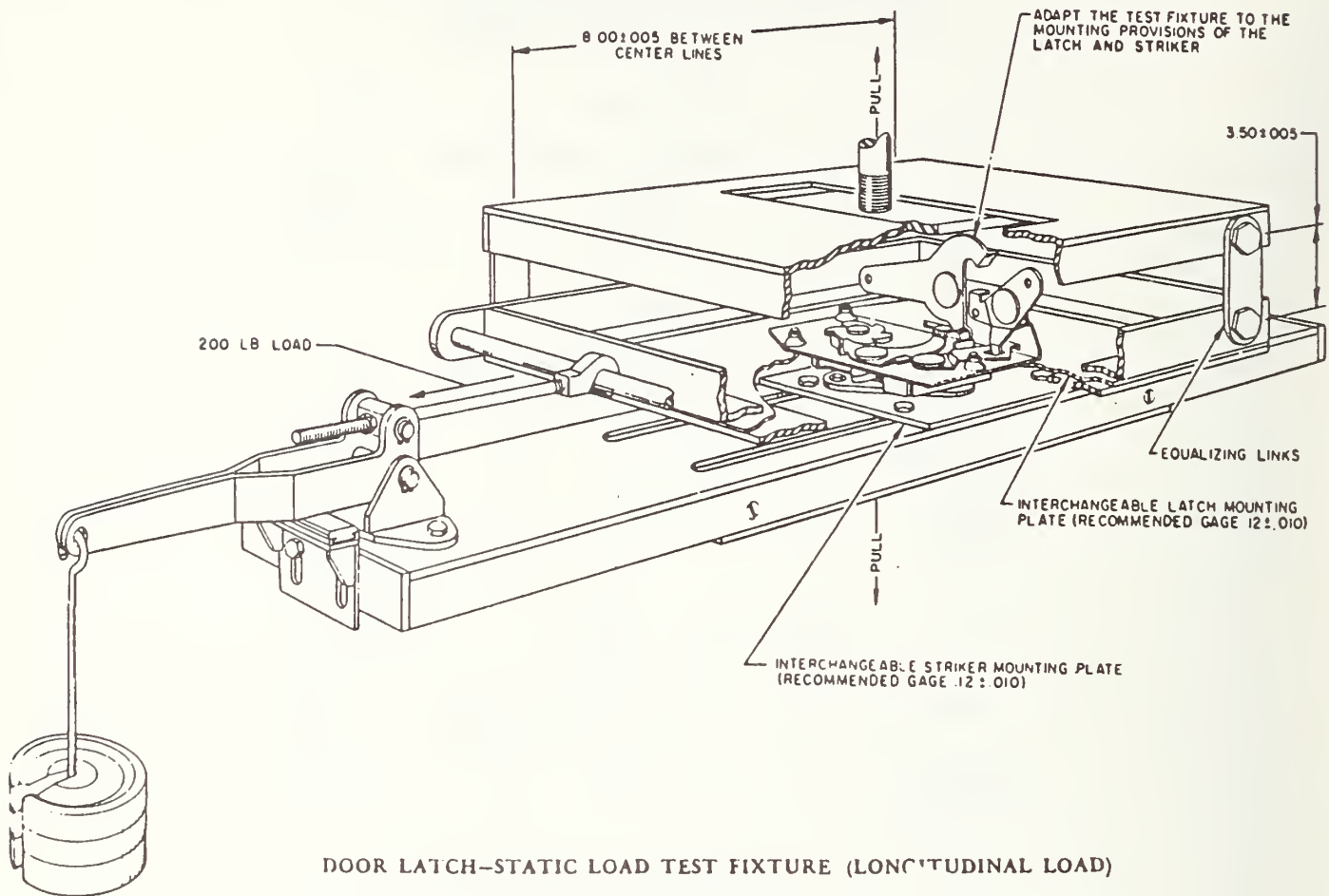
MAKE	MODEL	EJECTIONS
FORD	73	11
CHEVROLET	73	13
GMC	73	1
DATSUN	72	1
MAZDA	72	1

OTHER LIGHT VEHICLE

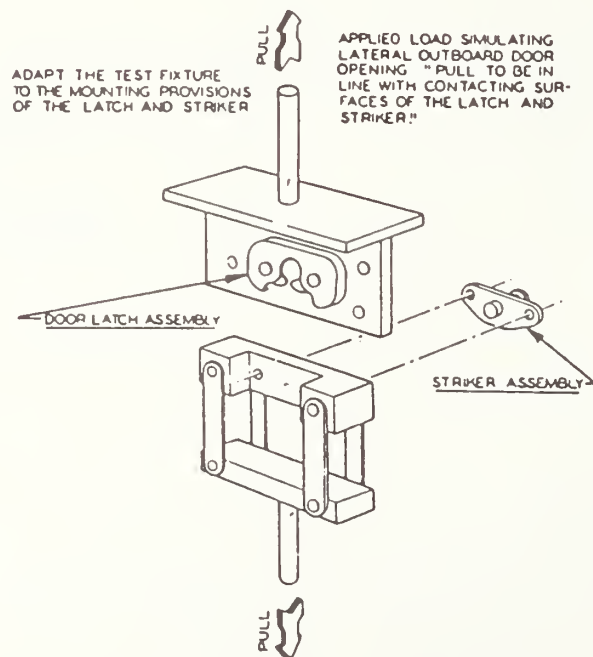
MAKE	MODEL	EJECTIONS
JEEP	76	1
CHEVROLET	76	1

Figure 1 - DOOR LATCH LONGITUDINAL AND TRANSVERSE LOAD DIRECTION

PASSENGER CAR COMPONENTS AND SYSTEMS

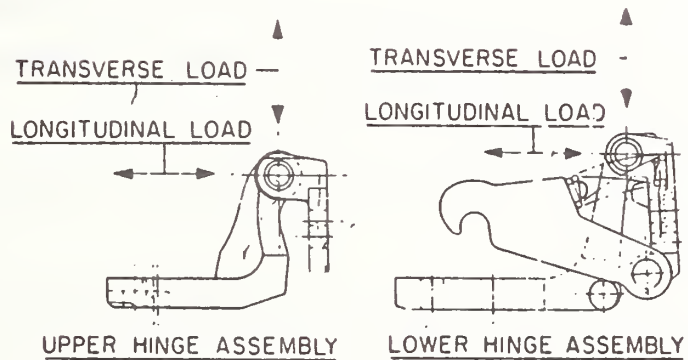
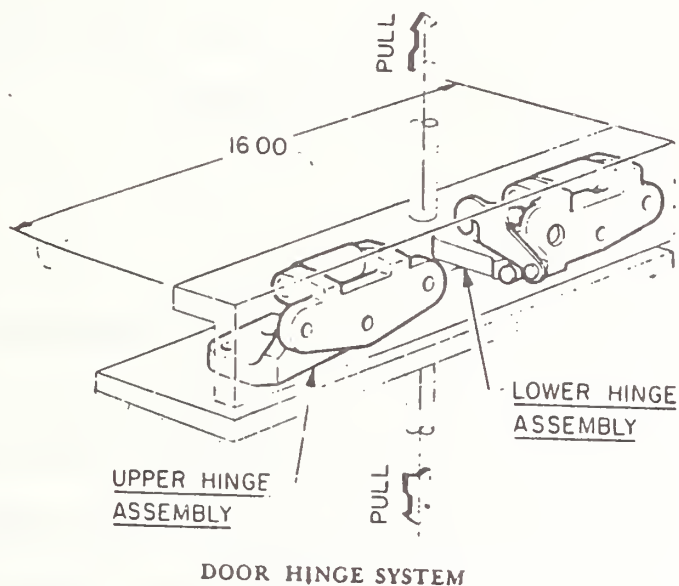


DOOR LATCH-STATIC LOAD TEST FIXTURE (LONGITUDINAL LOAD)



DOOR LATCH-STATIC LOAD FIXTURE (LATERAL LOAD)

Figure 2 - DOOR HINGE LONGITUDINAL AND TRANSVERSE LOAD DIRECTION



sustain the maximum loads. It was also well-known that nearly all modern vehicles so far were able to pass the FMVSS No.206 tests and yet ejection accidents have not been reduced markedly. In other words, the test may not be rigorous enough. It was hopeful that these tests would provide results which could lead to reinforce or strengthen the FMVSS No.206 in the future.

3.2 Test Specimen Selection

It was decided that the stock or on-shelf items were to be ordered and used for testing. The specimens were ordered in pairs: one was to be tested in the longitudinal direction and the other in the transverse direction of the specimens. A total of 24 pairs of door latches and hinges were purchased. This sample size was believed to be large enough to be statistically meaningful and at the same time, economically feasible.

The following criteria was used:

- * Selections were to be made from the stratified ejection rate ranking list: eight specimens from each of the high, average and low categories
- * Late model year cars was to receive priority in the selection, especially these were still in production 1985.
- * Selections should include products from major manufacturers, both domestic and foreign.

The models were selected from the 1983 FARS rank list as shown in Table 20.

The mean ejection rate was 69.76 per million vehicles. It was arbitrarily postulated that ejection rates from 59 and less than 80 per million vehicle were to be classified in the average category and those less than

59 in the low and from 80 and above in the high categories. Based on the above guidelines, the final selection is listed in Table 21.

3.3 Testing Procedure

A new test rig with a thicker mounting plate was constructed to conduct latch strength tests. The rig was first subjected to a calibration or flexing load. Then a specimen was mounted on the rig and tested in an INSTRON hydraulic machine. Similar to the FMVSS No.206 procedure, the tensile load was applied to the first specimen in the longitudinal or in-plane direction of one specimen until failure. Then the other specimen was mounted to sustain a transverse loading, i.e. a load acting in a perpendicular direction to its plane. In each case, the load was applied at a rate of 0.2 in (0.79 mm) per minute and no attempt was made to simulate a dynamic or impact loading. The load range was set at 5,000 lbs (2272 kg) maximum initially and switched to 10,000 lbs (4545 kg) range, if needed. The load was increased until breakage and an automatic recorder was used to obtain a force-deformation record. In all cases, the maximum load was marked on the curve; in some cases, the maximum were also the breaking loads.

3.4 Tests Results and Discussion

The maximum loads sustained by the latch and hinge specimens both in the longitudinal and in the transverse directions and the corresponding ejection rates are shown in Tables 22 and 23. The results were correlated with the ejection rates of the respective model year vehicles and will be discussed in the next section. A brief discussion of the test results is given in the sequel.

Table - 20

FARS: MAKES, MODELS & BODYTYPES
 NONSPORT PASSENGER CARS
 YEAR 1983

MAKE	MODEL	NUMBER	BODY_TYPE	MODEL
DODGE	5	10	2 DR SEDAN HT COUPE	CHALLENGER
DODGE	34	20	2 DR SEDAN HT COUPE	
DODGE	34	6	3/2 DR HATCHBACK	COLT
DODGE	34	2	4 DR SEDAN HT	
DODGE	34	3	STATION WAGON	
PLYMOUTH	8	23	2 DR SEDAN HT COUPE	HORIZON
PLYMOUTH	8	3	3/2 DR HATCHBACK	
PLYMOUTH	8	18	4 DR SEDAN HT	
PLYMOUTH	8	4	5/4 DR HATCHBACK	
PLYMOUTH	8	2	7	
PLYMOUTH	11	1	2 DR SEDAN HT COUPE	RELIANT
PLYMOUTH	11	13	4 DR SEDAN HT	
PLYMOUTH	11	2	STATION WAGON	
FORD	3	4	CONVERTIBLE	MUSTANG
FORD	3	192	2 DR SEDAN HT COUPE	
FORD	3	30	3/2 DR HATCHBACK	
FORD	3	3	4 DR SEDAN HT	
FORD	13	33	2 DR SEDAN HT COUPE	
FORD	13	27	3/2 DR HATCHBACK	ESCORT
FORD	13	9	4 DR SEDAN HT	
FORD	13	1	5/4 DR HATCHBACK	
FORD	13	10	STATION WAGON	
FORD	13	1	7	
MERCURY	3	14	2 DR SEDAN HT COUPE	CAPRI
MERCURY	3	13	3/2 DR HATCHBACK	
MERCURY	3	1	7	
MERCURY	12	6	2 DR SEDAN HT COUPE	ZEPHYR
MERCURY	12	6	4 DR SEDAN HT	
MERCURY	12	9	STATION WAGON	
BUICK	15	17	2 DR SEDAN HT COUPE	SKYLARK
BUICK	15	11	4 DR SEDAN HT	
CHEVROLET	13	68	2 DR SEDAN HT COUPE	CHEVETTE
CHEVROLET	13	28	3/2 DR HATCHBACK	
CHEVROLET	13	22	4 DR SEDAN HT	
CHEVROLET	13	14	5/4 DR HATCHBACK	
CHEVROLET	15	15	2 DR SEDAN HT COUPE	CITATION
CHEVROLET	15	6	3/2 DR HATCHBACK	
CHEVROLET	15	30	4 DR SEDAN HT	
CHEVROLET	15	9	5/4 DR HATCHBACK	
CHEVROLET	17	3	4 DR SEDAN HT	CELEBRITY

Table - 20 (continued)

FARS: MAKES, MODELS & BODYTYPES
 NONSPORT PASSENGER CARS
 YEAR 1983

MAKE	MODEL	NUMBER	BODY_TYPE	MODEL
PONTIAC	13	1	2 DR SEDAN HT COUPE	T-1000
PONTIAC	13	5	3/2 DR HATCHBACK	
PONTIAC	13	2	4 DR SEDAN HT	
PONTIAC	13	1	5/4 DR HATCHBACK	
VOLKSWAGEN	36	5	CONVERTIBLE	RABBIT
VOLKSWAGEN	36	49	2 DR SEDAN HT COUPE	
VOLKSWAGEN	36	8	3/2 DR HATCHBACK	
VOLKSWAGEN	36	14	4 DR SEDAN HT	
VOLKSWAGEN	36	1	5/4 DR HATCHBACK	
VOLKSWAGEN	36	1	STATION WAGON	
VOLKSWAGEN	36	4	7	
BMW	35	17	2 DR SEDAN HT COUPE	320I
BMW	35	2	4 DR SEDAN HT	
DATSUN	42	2	2 DR SEDAN HT COUPE	STANZA
DATSUN	42	2	4 DR SEDAN HT COUPE	
DATSUN	42	1	5/4 DR HATCHBACK	
DATSUN	43	17	2 DR SEDAN HT COUPE	SENTRA
DATSUN	43	4	4 DR SEDAN HT	
DATSUN	43	2	STATION WAGON	
HONDA	31	1	CONVERTIBLE	
HONDA	31	35	2 DR SEDAN HT COUPE	CIVIC
HONDA	31	34	3/2 DR HATCHBACK	
HONDA	31	2	4 DR SEDAN HT	
HONDA	31	8	STATION WAGON	
HONDA	31	1	7	
HONDA	33	11	2 DR SEDAN HT COUPE	PRELUDE
HONDA	33	2	3/2 DR HATCHBACK	
HONDA	33	1	4 DR SEDAN HT	
MAZDA	35	16	2 DR SEDAN HT COUPE	GLC
MAZDA	35	3	3/2 DR HATCHBACK	
MAZDA	35	14	4 DR SEDAN HT	
MAZDA	35	2	STATION WAGON	
MERCEDES-BENZ	31	2	2 DR SEDAN HT COUPE	300D
MERCEDES-BENZ	31	8	4 DR SEDAN HT	
TOYOTA	33	90	2 DR SEDAN HT COUPE	CELICA
TOYOTA	33	16	3/2 DR HATCHBACK	
TOYOTA	33	2	STATION WAGON	
TOYOTA	35	1	4 DR SEDAN HT	CRESSIDA
TOYOTA	38	23	2 DR SEDAN HT COUPE	TERCEL
TOYOTA	38	1	3/2 DR HATCHBACK	
TOYOTA	38	1	5/4 DR HATCHBACK	

Table - 21

FINAL 24 MODELS SELECTED FOR TESTING DOOR LATCHES/HINGES

MAKE	MODEL	<u>HIGH</u>			
		EJECTIONS	MOD.YR. 1983 TOTAL	FLEET POPUL. 81-83	EJECTION PER MILLION CARS
BMW	320I	40	21898	312532	128
MERCURY	CAPRI - DOMESTIC	89	10687	176553	124
TOYOTA	CELICA	243	73024	2145016	113
FORD	MUSTANG/MUSTANG II	637	61143	5848578	109
DODGE	CHALLENGER/FORIEGN	40	14064	408342	98
MAZDA	GLC	64	29440	673828	95
HONDA	PRELUDE	32	10914	343584	93
PLYMOUTH	HORIZON	146	51260	1816596	80

<u>AVERAGE</u>					
HONDA	CIVIC	157	88845	2141580	73
FORD	ESCORT (81 ON)	162	190788	2426136	67
CHEVROLET	CHEVETTE	353	87488	5554557	64
DODGE	COLT	34	31931	1753959	63
DATSUN	SENTRA	28	129707	455218	62
TOYOTA	TERCEL	54	100683	864280	62
DATSUN	STANZA	11	33324	183920	60
VOLKSWAGEN	RABBIT	134	36677	2259572	59

<u>LOW</u>					
PONTIAC	T-1000	17	13151	354003	48
MERCURY	ZEPHYR	52	18374	1203423	43
CHEVROLET	CITATION (80 ON)	136	51139	3311331	41
PLYMOUTH	RELIANT	30	94869	1242642	24
MERCEDES	300D	14	22235	642746	22
BUICK	SKYLARK	75	63874	3517212	21
CHEVROLET	CELEBRITY (82 ON)	3	79368	164644	18
TOYOTA	CRESSIDA	4	24661	229294	17

Table - 22

LOAD OF LONGITUDINAL AND TRANSVERSE DOOR LATCHES

MAKE	MODEL	EJECTION PER MILLION CARS	LONG LOAD (LBS)	TRANS LOAD (LBS)
------	-------	------------------------------	--------------------	---------------------

HIGH

BMW	320I	128	1475	2010
MERCURY	CAPRI - DOMESTIC	124	4500	2875
TOYOTA	CELICA	113	4620	2810
FORD	MUSTANG/MUSTANG II	109	4790	2180
DODGE	CHALLENGER/FORIEGN	98	4230	3000
MAZDA	GLC	95	4580	2375
HONDA	PRELUDE	93	4270	2980
PLYMOUTH	HORIZON	80	3140	3275

AVERAGE

HONDA	CIVIC	73	4590	3275
FORD	ESCORT (81 ON)	67	4050	2775
CHEVROLET	CHEVETTE	64	7510	2440
DODGE	COLT	63	4100	2845
DATSUN	SENTRA	62	2980	2600
TOYOTA	TERCEL	62	4980	3070
DATSUN	STANZA	60	2575	2525
VOLKSWAGEN	RABBIT	59	4300	4550

LOW

PONTIAC	T-1000	48	7500	4060
MERCURY	ZEPHYR	43	5350	3025
CHEVROLET	CITATION (80 ON)	41	7530	4450
PLYMOUTH	RELIANT	24	7840	2225
MERCEDES	300D	22	6920	3970
BUICK	SKYLARK	21	7510	4130
CHEVROLET	CELEBRITY (82 ON)	18	9000	4100
TOYOTA	CRESSIDA	17	5640	3040

Table - 23

LOAD OF LONGITUDINAL AND TRANSVERSE DOOR HINGES

MAKE	MODEL	EJECTION PER MILLION CARS	LONG LOAD (LBS)	TRANS LOAD (LBS)
		<u>HIGH</u>		
BMW	320I	128	6270	3360
MERCURY	CAPRI - DOMESTIC	124	--	--
TOYOTA	CELICA	113	7700	7680
FORD	MUSTANG/MUSTANG II	109	7500	5350
DODGE	CHALLENGER/FOREIGN	98	7130	7525
MAZDA	GLC	95	7600	5990
HONDA	PRELUDE	93	7500	6150
PLYMOUTH	HORIZON	80	7300	7600
		<u>AVERAGE</u>		
HONDA	CIVIC	73	7500	6280
FORD	ESCORT (81 ON)	67	7500	6200
CHEVROLET	CHEVETTE	64	4500	3200
DODGE	COLT	63	4900	6500
DATSUN	SENTRA	62	6850	4600
TOYOTA	TERCEL	62	7540	6750
DATSUN	STANZA	60	7500	6500
VOLKSWAGEN	RABBIT	59	5000	4450
		<u>LOW</u>		
PONTIAC	T-1000	48	4600	3100
MERCURY	ZEPHYR	43	7600	5350
CHEVROLET	CITATION (80 ON)	41	5400	7300
PLYMOUTH	RELIANT	24	7530	7540
MERCEDES	300D	22	6440	7500
BUICK	SKYLARK	21	7500	7270
CHEVROLET	CELEBRITY (82 ON)	18	5250	7330
TOYOTA	CRESSIDA	17	7650	6580

The hinges exhibited stronger resistance to both the longitudinal and transverse loads than companion latch assemblies. On the average, a hinge sustained over 6,000 lbs of applied force in each of the direction tests and 18 tests prematurely terminated due to limited capacity of the test fixture. In those cases in which the maximum loads were reached several modes of hinge failure occurred. Tear or breakage was observed in 2 longitudinal and 2 transverse cases, mounting hardware failure in 5 longitudinal and 10 transverse, the hinge pin center line was pulled out of the longitudinal center line due to hinge bending in 2 longitudinal and 6 transverse, and the hinge pulled apart in 1 longitudinal (Dodge Colt) case.

It is observed that the door hinges are in general two to four times stronger than the latches. This is so despite the fact that many hinges themselves were still intact, and the maximum loads took place when mounting bolts or other hardware fractured. This agrees with the accident data that door hinges seldom fail during car crash accidents. Also, this is the reason why door hinges are not a prime factor in occupant side door ejections.

In general, the latches sustained much lower maximum loads. The average longitudinal and transverse loads of all latches tested were 5,166 lbs (2348 kg) and 3,108 lbs (1431 kg), respectively. The failures were mostly due to the striker disengaging from the capture mechanism due to sheet metal distortion. This type of failure happened under loading in either directions, but most predominately under the transverse loading. In several cases, some other component or housing broke.

Figure 3 through 12 show the typical specimens after being tested to failure. Five were tested under longitudinal loading and the other five, under transverse loading. Different modes of failure were

evident from these photographs, for example, torn housing (Figures 3 and 4) broken components (Figures 5 and 6), broken mounting screw (Figure 7) and a typical failure described as "disengagement of striker from latch" (Figures 8 through 12).

It should also be noted that one latch failed (BMW-320I) below the minimum FMVSS No.206 loading in the longitudinal direction and barely exceeded the minimum in the transverse direction. Other latch specimens tested in this study were able to meet with FMVSS No.206 standards, some by a rather small margin and many with a comfortable margin, especially in the longitudinal loading conditions.

The following illustrate some of the notable results:

- The BMW Model 320i assemblies consistently performed below average and one specimen failed at a longitudinal load of 1,475 pounds. This correlates with its the highest ejection rate (128 per million) of all the models included in the investigation.

- The Plymouth Reliant (K body) stood out among all the Chrysler models by low ejection rates and sustaining of high loads in three of the four tests. The exception is the latch test under transverse loading in which the hardware failed. Other Chrysler models generally have substantially higher ejection rates and had performed well below average in the longitudinal latch tests because of premature striker failure.

- The Volkswagen Rabbit sustained the highest transverse latch load before disengaging; however its hinge sample fell below average in the transverse load because of mechanism breakage.

- In agreement with its high ejection rating the Toyota Celica latch assembly mounting hardware was unable to sustain average loads;

Figure 3. Torn Housing



Figure 4. Torn Housing

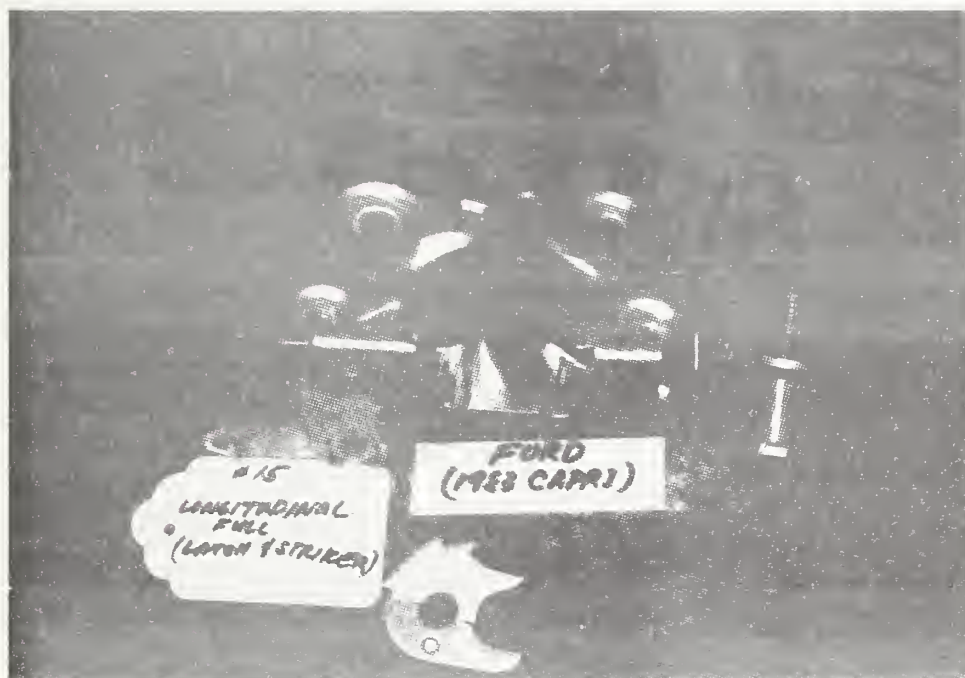


Figure 5. Broken Component



Figure 6. Broken Component



Figure 7, Broken Mounting Screw



Figure 8, Disengagement of Striker



Figure 9. Disengagement of Striker



Figure 10. Disengagement of Striker



Figure 11. Disengagement of Striker

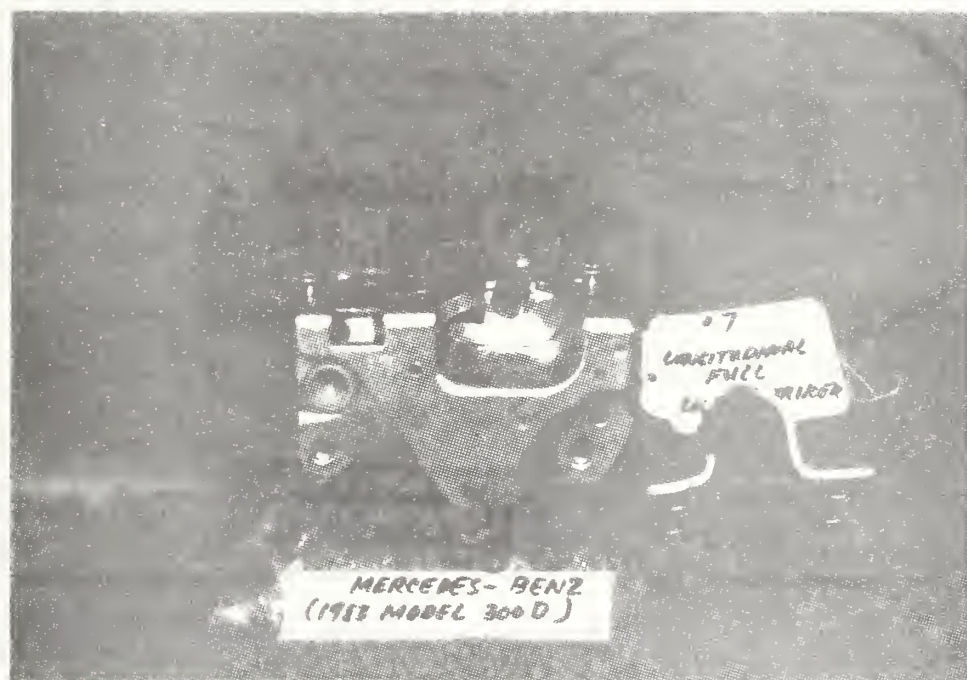
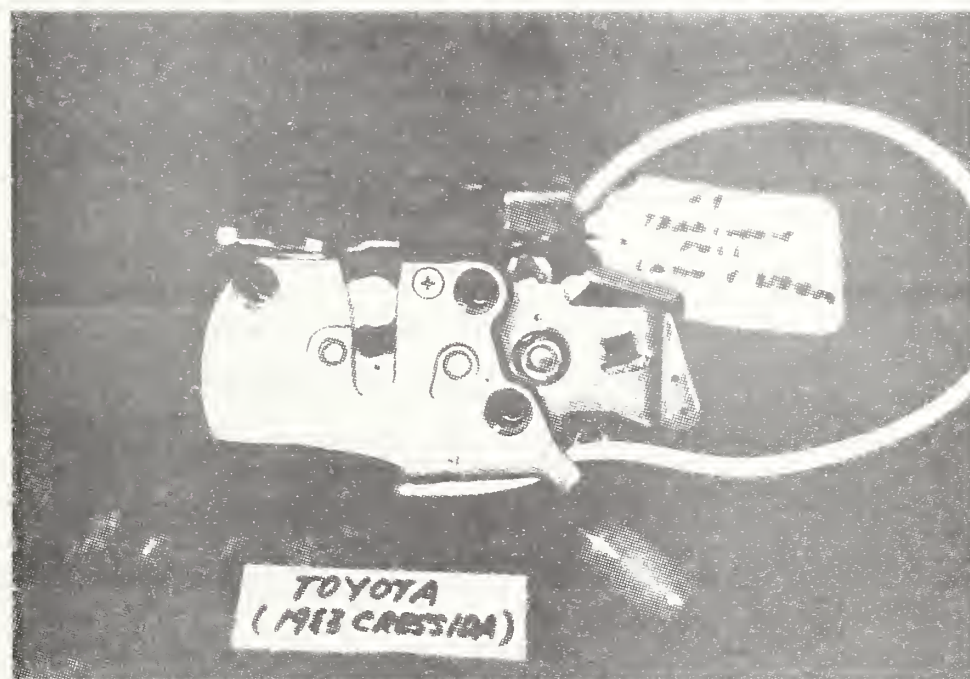


Figure 12. Disengagement of Striker



the Tercel and Cressida models with significantly lower ejection rates, sustained considerably higher latch loads. However, the hinge of the Celica samples sustained much higher loads than the other two Toyota models.

- Latch assemblies for the Mazda GLC were associated with the high ejection rates and as expected, they failed below average loads in both the longitudinal and transverse tests. The failure occurred when the striker became disengaged from the latch.

- Nissan Sentra and Stanza models proved typical of the general pattern of latch-test results--near the bottom in load resistance (and prone to breakage) and near the middle in ejection rates (62 and 60 respectively).

- All five GM models withstood high longitudinal latch loads; the Chevrolet CELEBRITY test sustained the highest load before damage was observed.

- The Toyota CRESSIDA, having the lowest ejection rate in the sample, demonstrated better than average longitudinal resistance in latch tests.

3.5 Possibility of Improved Design

The predominant cause of latch failure among the specimens tested was due to sheet metal distortion causing the post-type striker to disengage from the capture mechanism. The latch was assembled by riveting of stamped parts and was not designed for overhauling and replacement by components.

To increase the load capacity of the capture mechanism thicker gauge sheet metal may be all that is required. An extensive redesign of latch is unnecessary at this point in time.

It is expected that, the same stamping die can be used without modification. Some manufacturers may be persuaded to cooperate in making a few prototype specimens for testing. To do this in a laboratory is not feasible or involves a prohibitive cost, e.g., to procure a stamping die and other specialized equipment. For this reason, the new design was not attempted in this study.

4. ANALYSIS AND DISCUSSION OF RESULTS

4.1 Ejection Pattern

Direct impacts to the front and side of the vehicle result in the greatest number of ejection injury cases. Side-area ejections are usually prompted by impacts to the front or same side of the vehicle. The exact location on the vehicle of the most severe impact often cannot be determined, particularly in the more common form of ejections through windshields and front side areas. Ejections through the rear half of the vehicle turn out most often linked to right-side impacts.

Ejections with injury appears most likely to occur when the occupant's vehicle strikes a fixed object, collides at an angle with another moving vehicle, or overturns on its own accord.

Ejections from overturned vehicles are most often through the left-front door or window. Ejections from collisions with another vehicle in transport or with fixed objects are predominantly through left or right frontal side areas (owing to impact-angle, inertia, seating location factors, etc.) Collision with another vehicle in transport is the most frequently cited harmful event, although injury through collisions with a variety of fixed objects are nearly as prevalent. Approximately one half of the total door ejections cases and 2 out of 5 reported window ejections are the result of collisions with the another vehicle in transport.

Ejection media, that is, the door, window or roof structure through which ejection occurs, were found closed when damaged in a majority of cases involving collisions with another moving vehicle. The probability of a medium found open prior to impact or ripped open or separated increases significantly in injuries from rollover or collision with fixed natural or man-made objects along the roadway. The fact emerges that vehicle body integrity alone cannot solve the salient problem of ejection.

Ejection media (door, window or roof structure) that are open, separated or ripped open are considerably more common in single-vehicle accidents than in collisions with another vehicle in transport. Among the latter, however, angular collisions appear to be a causal factor in medium opening or separation.

Ejection media (door/window) were most frequently open when the most severe impact occurred to the left or right-side of the vehicle. However, only right side impact appears to influence the probability of the medium being separated or ripped open. Media were most often found closed or closed when damaged after frontal or undeterminable impacts.

Most ejection fatalities result from single-vehicle accidents (overturn, collision with fixed/stationary objects or nonmotorist.) Front-side area ejections account for most deaths in multi-vehicle collisions.

The number of deaths resulting from ejection on frontal impact decreased from 1981 to 1983, in contrast to the number from left- or right-side impacts which doubled over the period. In most fatal windshield ejections, point of impact was not determined.

4.2 Injury Patterns/Sources

The head (skull) and the face are two leading body regions that are highly susceptible to ejection injuries. The third most frequently injured body region is the chest or upper torso and this is followed by leg and arm injuries. The next in relative importance is pelvic/hip region and equal numbers of neck, back and abdominal injuries round out the list of body regions.

The source of most ejection injuries, regardless of body region, is ground contact. (The immediate implication of this finding is the apparent lack or disregard of sufficient passenger restraint to withstand the full range of ejection force. Reducing complete ejections could mean significant reduction in the number of related injuries and fatalities.) The head, arm and pelvis are again particularly vulnerable to ground and exterior impact and resulting trauma. Other significant sources of injury are the steering column and attachments, the interior surfaces on either side, side window glass and frame, the windshield and the instrument panel (skull and knee injuries) and area below.

Head and facial injuries are associated with a large percentage of deaths, as are the chest injuries. The head and facial injuries can be inflicted by impacting any part of the vehicle interior followed by a complete or partial ejection. However, in many cases, the exact source of impact is often unspecified. Chest injuries are attributable to striking the steering column or side interior before ejection which may be incidental to the injuries. Leg and arm injuries can be caused by striking the instrument panel or other interior body region as post ejection impacts. Regardless of injury sources, i.e., the interior objects impacted, the most frequent injuries are head (skull) and face followed by chest and leg.

Two-door sedan and hatchback models are involved in an disproportionate share of accidents resulting in occupant ejection. In more than 4 out of 5 multiple- or single-car accidents with ejection, the victim is an occupant of a two-door passenger car. This ratio appears too high to be discounted and may, in fact, point to possible structural deficiencies in small cars and/or to the insufficiency of related safety mechanisms. The problem is more apparent in complete than partial ejection cases.

4.3 Correlation Analysis Between Ejection Rates and Test Results

The maximum loads of the hinge specimens were plotted against the corresponding ejection rates. Figures 13 and 14 show the results. It is evident that the ejection rate is virtually independent of hinge loads in both longitudinal and transverse directions. We note in passing that in about one half of the longitudinal tests and in 6 transverse tests the ultimate loads were never reached. The results were nevertheless analyzed by a statistical method to determine the correlation coefficient between hinge loads and ejection rates. The results are shown in corresponding Tables 24 and 25. It is seen that the correlation coefficients are -0.25 and 0.20 for transverse and longitudinal loading, respectively, and the data for longitudinal loading tests showed a wrong trend. The level of confidence for the correlation values was also low. This implies that door hinge strengths have little to do with occupant ejections. The above conclusion agrees with real-world accident data in which the door hinges seldom fail during accidents involving ejections.

The same procedure was used to analyze the latch loads. The results for the transverse latch load are shown in Table 26. It is seen that the correlation for transverse latch load with ejection rate is not very high, having a value of -0.53, but appreciably higher than that

Figure 13. HINGE LONGITUDINAL - FORCES VERSUS EJECTION RATES

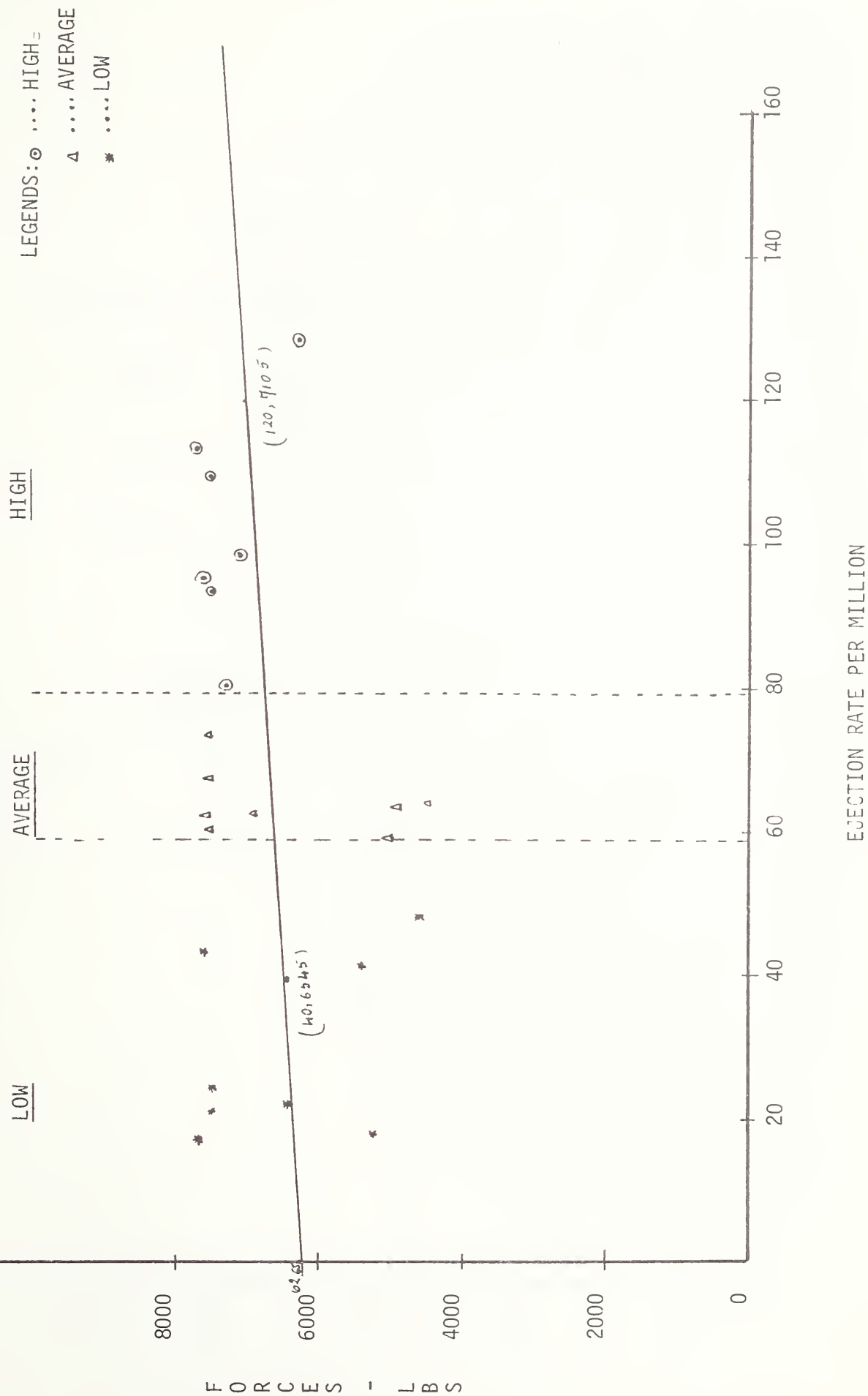


Figure 14 . HINGE TRANSVERSE - FORCES VERSUS EJECTION RATES

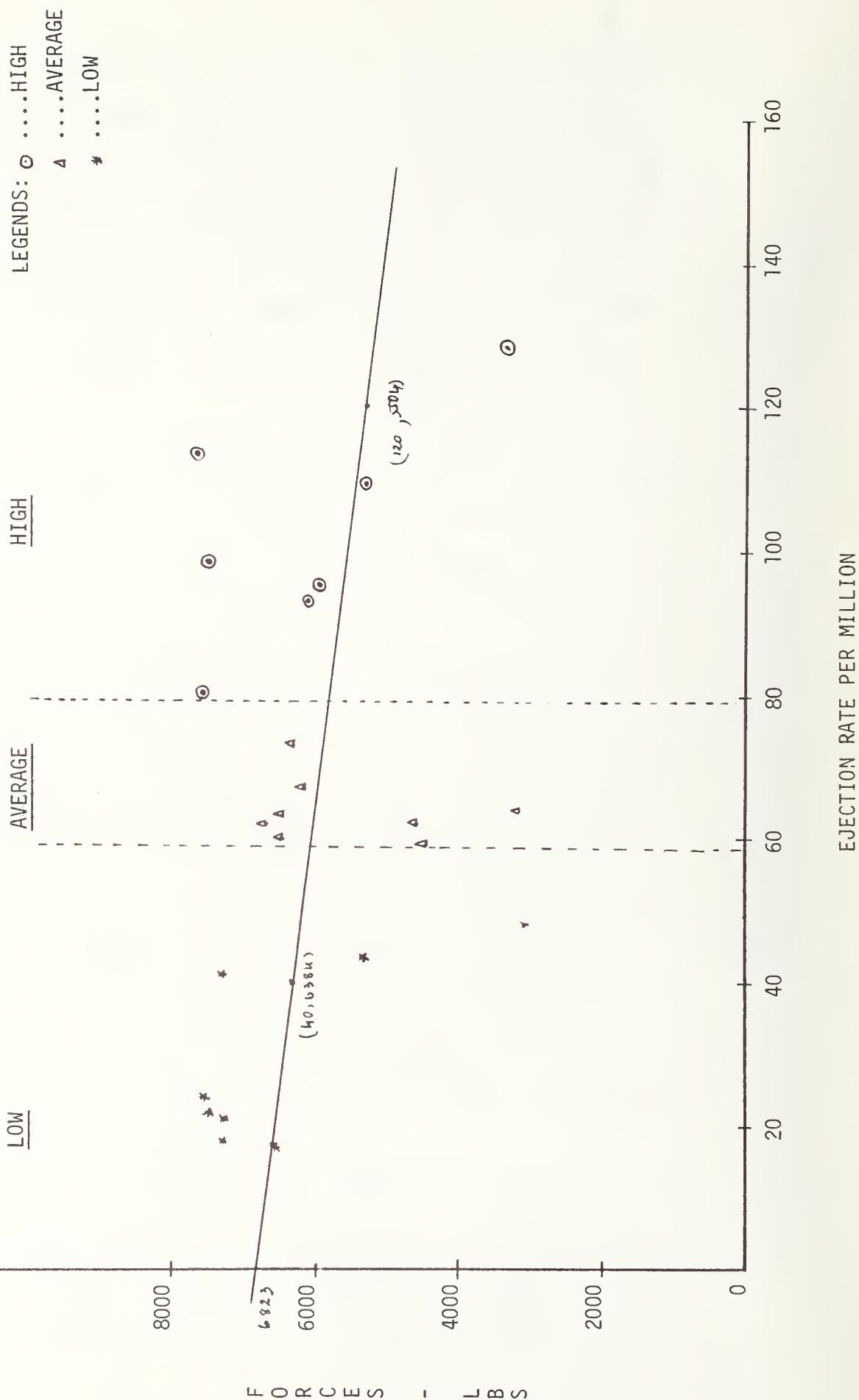


Table - 24

HINGE (LONGITUDINAL)

CORRELATION OF LONGITUDINAL LOAD AND EJECTION RATES

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
EJCTRATE	23	63.50	32.07	1460.00	17.00	128.00
LONG. LOAD	23	6707.00	1143.00	154260.00	4500.00	7700.00

	CORRELATION COEFFICIENT R	CONFIDENCE LEVEL R \neq 0
EJCTRATE	0.20	63%

Table - 25

HINGE (TRANSVERSE)

CORRELATION OF TRANSVERSE LOAD AND EJECTION RATES

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
EJCTRATE	23	63.00	32.08	1460.00	17.00	128.00
TRANS. LOAD	23	6092.00	1464.00	140105.00	3100.00	7680.00

	CORRELATION COEFFICIENT R	CONFIDENCE LEVEL $R \neq 0$
EJCTRATE	-0.25	76%

obtained for the hinge load as discussed before, and it has the right trend by associating higher loads with lower ejection rates. The longitudinal latch loads correlate fairly strongly to the ejection rates, with an inverse correlation coefficient as high as -0.67 as seen in Table 27. This result is supported by Figures 15 and 16 in which a marked slope of the regression line is evident. The level of confidence in the existence of a correlation between ejection rate and both the transverse and longitudinal latch loads were high, being above 99%. The correlation values for the latch loads, even though not high from a statistical point of view, are sufficiently high to support the engineering hypothesis that latches are a critical factor in the undesired opening of doors during crashes, thus making it easier for occupant ejection to take place. It must be recognized that the FARS data do not contain information on the ejection path, and it was not possible to select only those cases which were attributable to door ejections. If it was possible, then it is expected that there would be a higher correlation between the door ejection rate and the latch loads.

Encouraged by this apparently strong correlation for longitudinal latch loads and fair correlation for transverse latch loads with the ejection rates, two more analyses were also carried out. The first analysis was to investigate if a strong correlation also existed between the maximum latch loads, both longitudinal and transverse, and the area under the corresponding load deformation curves. Table 28 shows the energy measure given by the area under the force-deformation curve for longitudinal and transverse. Figure 17 and Table 29 show the results for the longitudinal loads and Figure 18 and Table 30 shows the result for the transverse case. In both cases, there is a strong positive correlation

Table - 26

LATCH (TRANSVERSE)

CORRELATION OF TRANSVERSE LOAD AND EJECTION RATES

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
EJCTRATE	24	66.00	33.71	1584.00	17.00	128.00
TRANS. LOAD	24	3107.71	734.44	74585.00	2010.00	4550.00

	CORRELATION COEFFICIENT R	CONFIDENCE LEVEL R \neq 0
EJCTRATE	-0.53	99%

Table - 27

LATCH (LONGITUDINAL)

CORRELATION OF LONGITUDINAL LOAD AND EJECTION RATES

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
EJCTRATE	24	66.00	33.71	1584.00	17.00	128.00
LONG. LOAD	24	5165.83	1897.75	123980.00	1475.00	9000.00

	CORRELATION COEFFICIENT R	CONFIDENCE LEVEL R \neq 0
EJCTRATE	-0.67	100%

Figure 15 LATCH TRANSVERSE - FORCES VERSUS EJECTION RATES



Figure 16. LATCH LONGITUDINAL - FORCES VERSUS EJECTION RATES

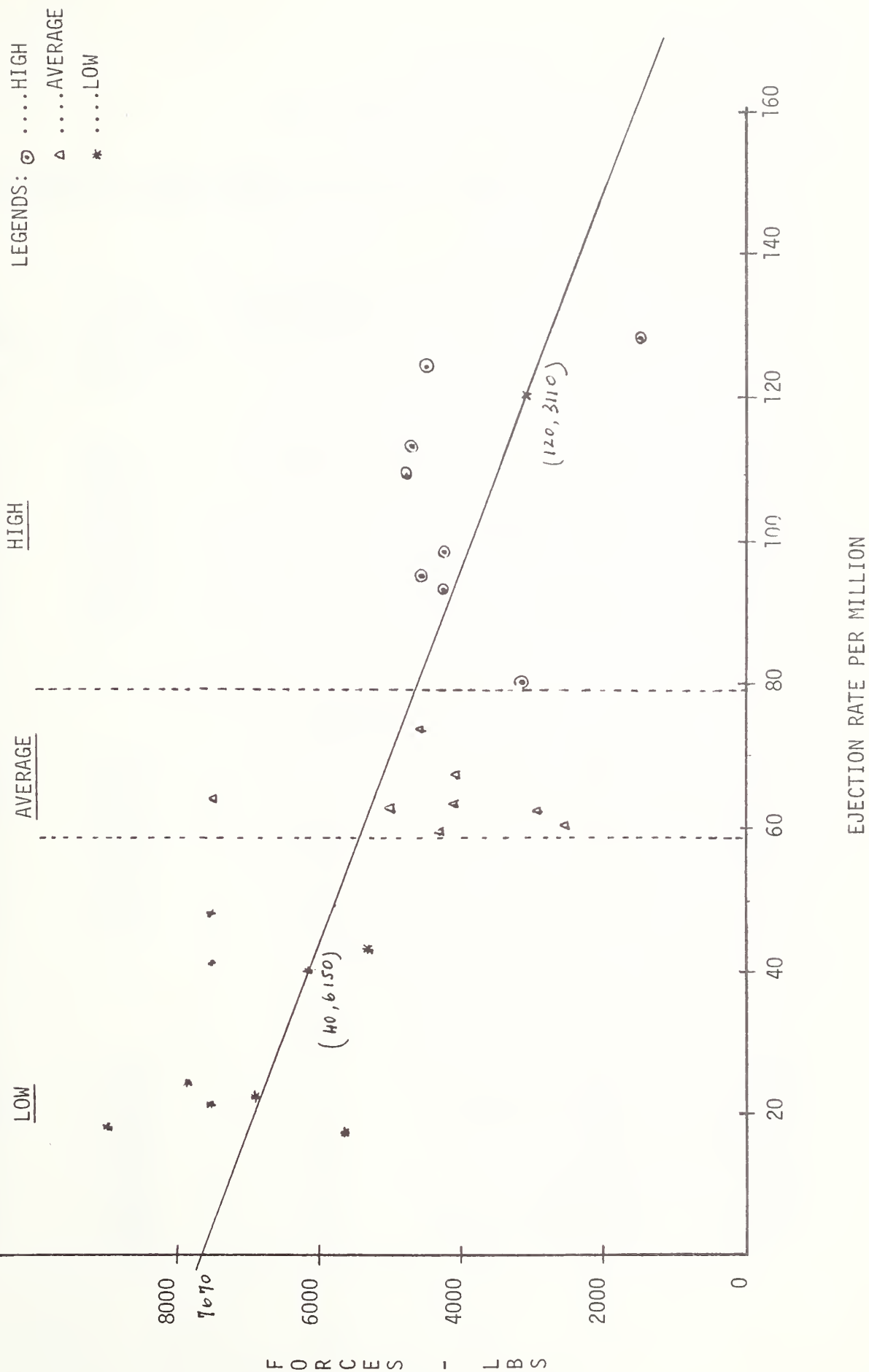


Table - 28

AREA UNDER THE FORCE-DEFORMATION CURVE OF LONGITUDINAL AND TRANSVERSE LATCHES

MAKE	MODEL	EJECTION PER MILLION CARS	AREA LONG. LOAD (IN-LBS)	AREA TRANS. LOAD (IN-LBS)
		<u>HIGH</u>		
BMW	320I	128	533	804
MERCURY	CAPRI - DOMESTIC	124	2045	1093
TOYOTA	CELICA	113	1248	1517
FORD	MUSTANG/MUSTANG II	109	2526	610
DODGE	CHALLENGER/FORIEGN	98	1867	1200
MAZDA	GLC	95	3182	1140
HONDA	PRELUDE	93	2594	3067
PLYMOUTH	HORIZON	80	440	2293
		<u>AVERAGE</u>		
HONDA	CIVIC	73	2519	3237
FORD	ESCORT (81 ON)	67	2240	1440
CHEVROLET	CHEVETTE	64	2920	1463
DODGE	COLT	63	1847	910
DATSUN	SENTRA	62	1555	1050
TOYOTA	TERCEL	62	2915	1290
DATSUN	STANZA	60	1471	1300
VOLKSWAGEN	RABBIT	59	606	1356
		<u>LOW</u>		
PONTIAC	T-1000	48	2063	1768
MERCURY	ZEPHYR	43	2686	1089
CHEVROLET	CITATION (80 ON)	41	3064	2864
PLYMOUTH	RELIANT	24	2364	839
MERCEDES	300D	22	3767	2842
BUICK	SKYLARK	21	3027	2992
CHEVROLET	CELEBRITY (82 ON)	18	4768	2420
TOYOTA	CRESSIDA	17	3068	1277

Figure 17. LATCH LONGITUDINAL - ENERGY (AREA) VERSUS FORCES

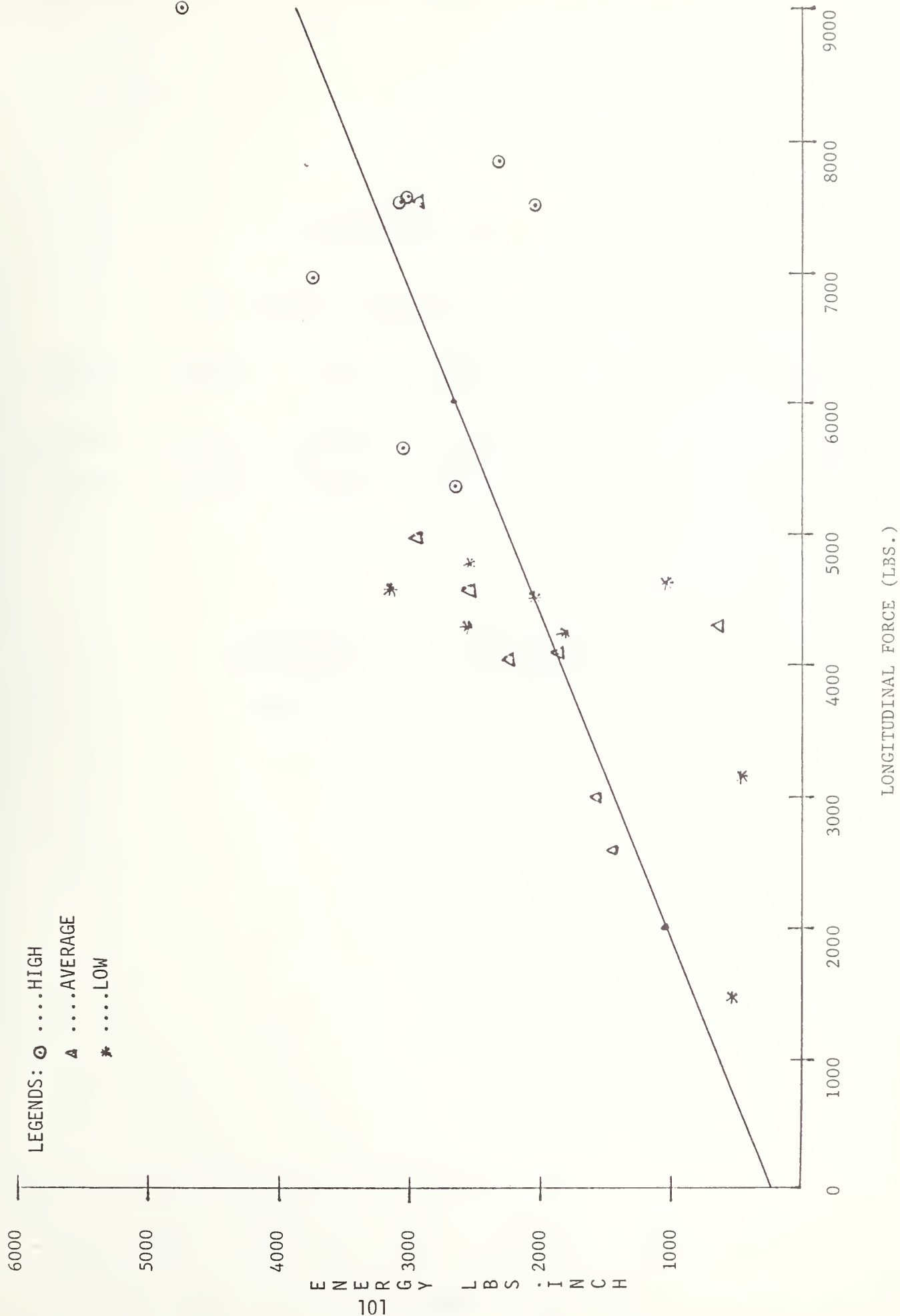


Table - 29

LATCH (LONGITUDINAL)

CORRELATION OF LONGITUDINAL LOAD AND AREA

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
AREA	24	2304.79	1024.52	55315.00	440.00	4768.00
LONG. LOAD	24	5165.83	1897.75	123980.00	1475.00	9000.00

	CORRELATION COEFFICIENT R	CONFIDENCE LEVEL R \neq 0
AREA	0.74	100%

Figure 18. LATCH TRANSVERSE - ENERGY (AREA) VERSUS FORCES

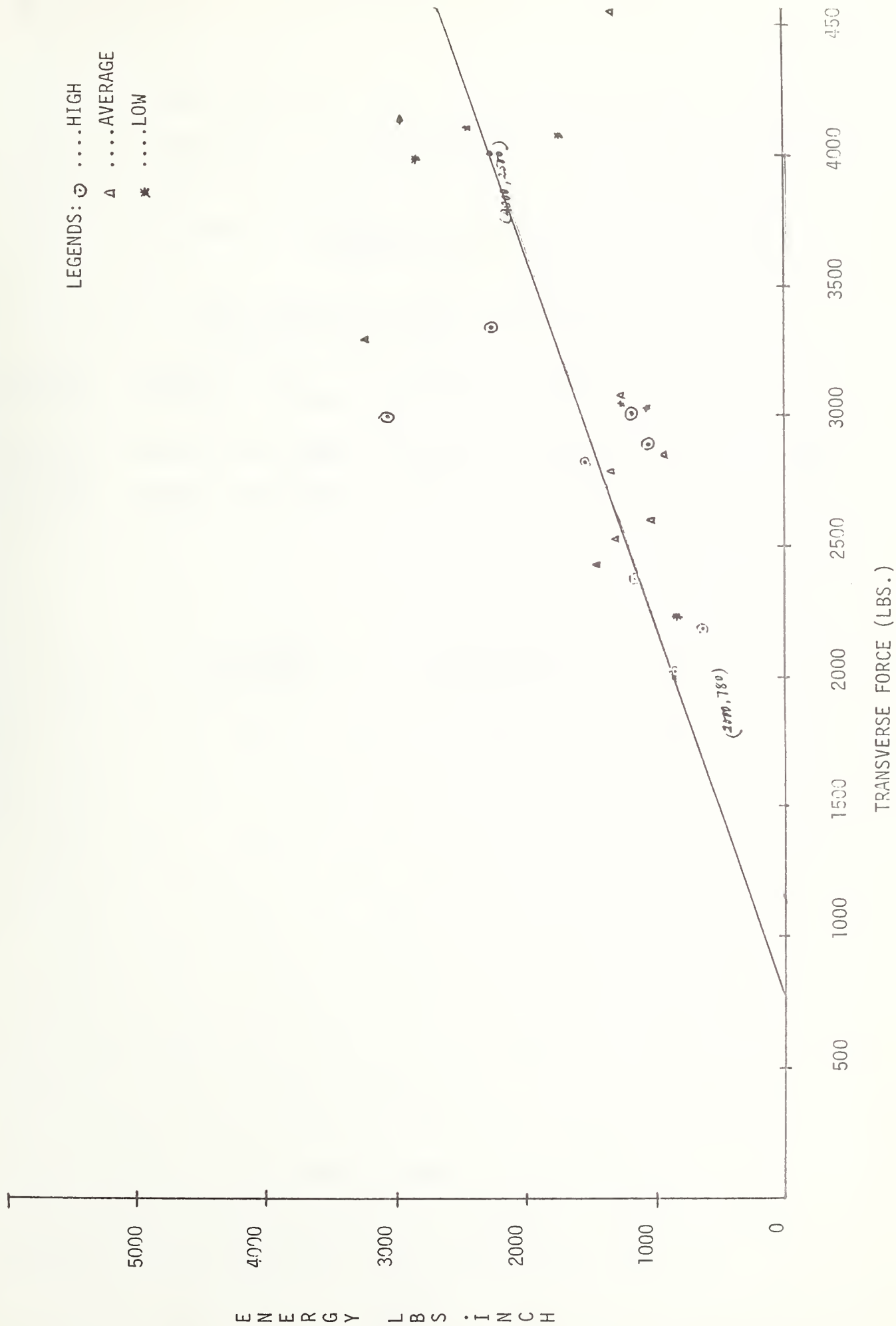


Table - 30

LATCH (TRANSVERSE)

CORRELATION OF TRANSVERSE LOAD AND AREA

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
AREA	24	1660.88	814.65	39861.00	610.00	3237.00
TRANS. LOAD	24	3107.71	734.44	74585.00	2010.00	4550.00

	CORRELATION COEFFICIENT R	CONFIDENCE LEVEL R \neq 0
AREA	0.64	100%

between the maximum load and the area under the load deformation curve, though it is again higher for the longitudinal case. It is a common notion that the area under a load-deformation curve gives a measure of energy absorption or toughness of the test specimen. This strong correlation seems to suggest that, for the latch specimens at least, the maximum load, though measured under a quasi-static test condition, is also a good indication of the toughness of the specimen. In other words, the relative toughness of different specimens would be expected to remain the same as that for static loading. The maximum dynamic loads would be expected to be different, presumably higher, than the static load of the same specimen. However, the analysis seems to indicate that a dynamic test would be expected to give results not qualitatively different from that from static tests. To confirm this finding, the areas under the load-deformation curve for the latch tests were also plotted against the ejection rates. As shown in Figure 19 and Table 31 for the longitudinal case and Figure 20 and Table 32 for the transverse case, a reasonably high negative correlation is indicated for longitudinal loads and lower negative correlation for the transverse loads. It appears that the energy measure as given by the area under a load deformation curve would not provide new information radically departing from the maximum static loads of the test specimens.

Because of the variety of factors that enter into the ejection rate, it is not clear how accurately the ejection rate reflects the strength of door latches/hinges. The ejection rate of each model is partially a function of factors not explicitly considered in this project, such as the size and weight of the car, its uses, and the driving habits of the typical owner, and there are valid questions about the role of the door latches/hinges in occupant ejection. Further study to supplement the data currently available would help to answer these pertinent questions.

Figure 19. LATCH LONGITUDINAL - ENERGY (AREA) VERSUS EJECTION RATES

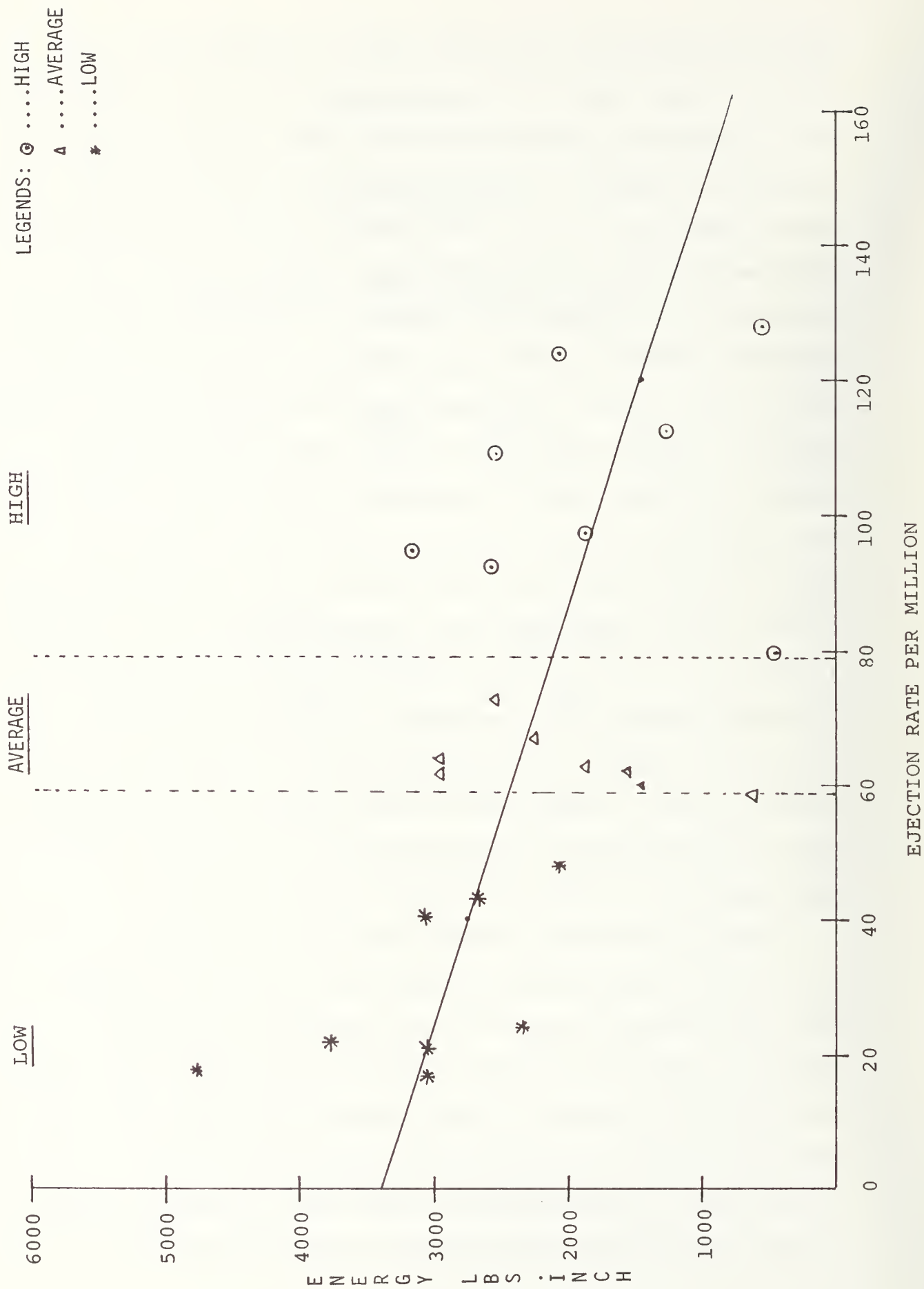


Table - 31

LATCH (LONGITUDINAL)

CORRELATION OF AREA AND EJECTION RATES

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
AREA	24	2304.79	1024.52	55315.00	440.00	4768.00
EJCTRATE	24	66.00	33.71	1584.00	17.00	128.00

	CORRELATION COEFFICIENT R	CONFIDENCE LEVEL R \neq 0
AREA	-0.54	99%

Figure 20. LATCH TRANSVERSE - ENERGY (AREA) VERSUS EJECTION RATES

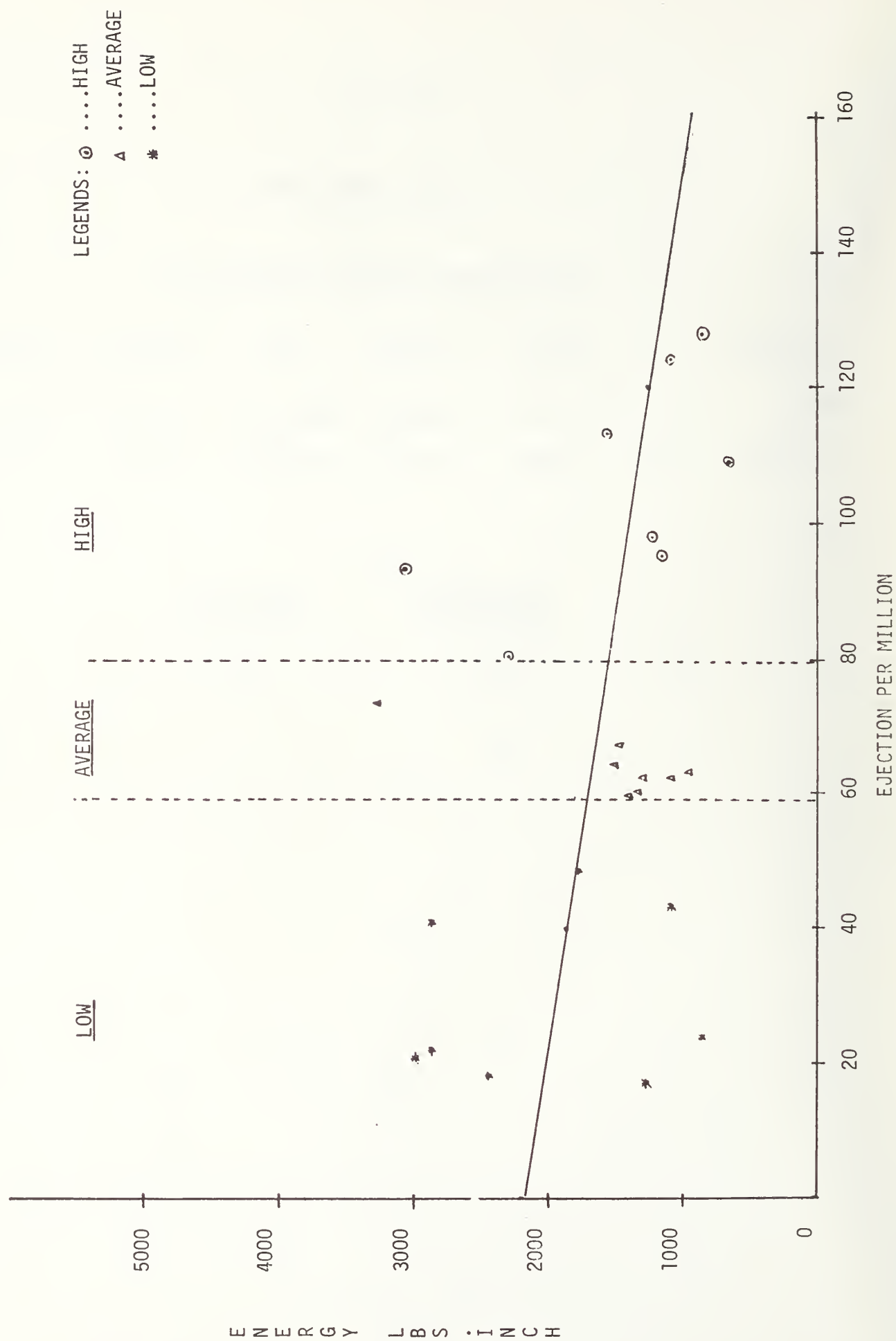


Table - 32

LATCH (TRANSVERSE)

CORRELATION OF AREA AND EJECTION RATES

VARIABLE	N	MEAN	STD DEV	SUM	MINIMUM	MAXIMUM
AREA	24	1660.88	814.65	39861.00	610.00	3237.00
EJCTRATE	24	66.00	33.71	1584.00	17.00	128.00

	CORRELATION COEFFICIENT R	CONFIDENCE LEVEL R \neq 0
AREA	-0.34	89%

5. CONCLUSION

1) Occupant ejection is a rare event, contained in less than two percent of NASS cases, but is a major factor in fatalities, in that one out every five fatalities in FARS cases was associated with ejection.

2) About fifty percent (50%) of ejections (with AIS 3 and above) were through the door and thus should be related to the strength or toughness of latch/hinge system of the vehicle. The remaining ejections were due to ejection through side window, windshield or rear window, etc. Among the cases attributable to side door ejection, the number due to latch failure causing spontaneous disengagement, could not be ascertained for most cases.

3) The leading source of ejection-related injuries was ground impact, followed by impact with car interior parts prior to ejection, including windshield and window glass, frames and steering columns; the leading body regions impacted were head/face followed by chest, limbs and other body regions.

4) During the period of 1981 to 1983, among the fatality cases, the foreign made cars are associated usually with higher ejection rates and domestic cars associated with lower ejection rates.

5) Among 24 specimens of 1983 vintage, the ejection rates are strongly correlated with latch loads in the longitudinal direction, and have a reasonable level of correlation with latch loads in the transverse direction. In both cases, the correlation coefficients are negative in sign as expected. This means high latch forces correlating with low ejection rates. Ejection rates are virtually independent of hinge loads in both

longitudinal and transverse directions. Actually the correlation analysis for the hinge loads does not serve any practical purpose in this study, for the following reasons:

1. Accident data show that hinges seldom fail in a car crash. Thus one would not expect any appreciable correlation with ejection rates.
2. About half of the hinges were not tested to failure, since they withstood the maximum load available from the apparatus. Thus for these cases, one could not calculate a meaningful correlation with the ejection rate.

6) The areas under load-deformation curves for the latch tests are also correlated with ejection rates, more strongly for the longitudinal loads than the transverse. This suggests that the toughness or energy absorption of the latch specimens correlate strongly with static loads.

7) Latch specimens selected from models/makes associated with low ejection rates generally sustained two to three times the longitudinal loads specified by FMVSS No.206. Eight specimens in low ejection rate stratum withstood 5,000 lbs (2272 kg) at a minimum.

8) Due to the diversified design and failure modes, no clear cut weakness of latch design can be pinpointed. The results appear to be mixed at best and specific recommendations for improved design of latch are premature and must await future study. Therefore, no specific recommendations concerning improved latch designs and tests are given in this study.

6. SUGGESTIONS FOR FUTURE STUDIES

6.1 Ejection Rate

In principle, the ejection rate should be defined by the ejection counts for any given vehicle divided by its exposure. In this report, the ejection rate is defined as ejection counts per million registered car-years i.e., the exposure is defined as the number of vehicles registered per year. This definition tacitly assumes that all registered vehicles of different makes or models were driven with the same amount of miles per year. This assumption may cause biased results, and it may be useful in a future study to define the exposure based on the number of miles driven, thus requiring data on the mileage driven records.

6.2 Ejection

The ejection counts denote the number of occupants that were thrown out of the car. However, not all ejections were due to the latch/hinge failures. The ejection through windshields, rear window or open/soft tops should be excluded, but at the present time FARS data do not give ejection paths and the NASS data are not sufficient for a national analysis since they are localized to certain sampling areas. Even in some open door ejections, the strength of the latch/hinge may be irrelevant. For example, the door handle may be inadvertently pushed, causing the door to open, or the door was not closed properly in the first place. For a proper calculation of the ejection rate through doors, all these cases should be identified and eliminated from the database. Other factors, such as the occupant restraint system, impact speed, driving behavior for different vehicle types could also affect ejection causes and ejection rates.

6.3 Latch/hinge Design Changes

In this study, it was assumed that the latch/hinge design for a given model/make car stayed the same through the period 1978-1983. This is probably true for the makes studied. But if there should be a design change for same models/makes, the year of design change should be identified and the ejection counts should be allocated for different periods before and after the change.

6.4 Sample Size Enlarging

Since the NASS data was designed and collected with respect to all, not just ejection related accidents, the originally sizeable sample size, in the order of 10,000 cases per year contains only 100 to 150 ejection cases per year. This small sample size is expected for a rare event such as ejections, but could cause biases and distortions in the results.

It is suggested, in order to build up a rich database, that a special study be designed in NASS for all ejection related accidents. Other special studies have been undertaken in the past for special purpose projects. Such a study can include information specifically related to door ejections and latch failure and can focus on certain car makes if necessary.

6.5 Increasing Minimum Load Requirements

As stated before, a substantial number of specimens withstood more than twice the FMVSS No.206 specified minimum loads. It would appear that the minimum loads in some directions, such as longitudinal direction for latch test, could be increased by at least one hundred percent (100%) with little or no cost if a sufficient lead time was granted. Further study should be made to establish the reasonableness of this increase. Would this increase require a major redesign of basic latch mechanism? The

answer is negative since some designs, including compact and subcompact vehicles, can already satisfy this requirement without modification. Many more perhaps can pass the test with minimal modification.

APPENDIX A

Frequency Distributions of Ejection

Table A-1 AIS INJURY LEVELS BY EJECTAREA AND IMPTYPE
1983 NONSPORT PASSENGER CARS

17:34 WEDNESDAY, JULY 16, 1986

TABLE OF EJECTAREA BY IMPTYPE

EJECTAREA	EJECTION AREA (WINDSHIELD, LF, RF, LR, RR)				IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE
FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SIDE DE(3)	RIGHT SIDE REAR (4)	OTHER IM PACT(5)	TOTAL	
WINDSHIELD (1)	4 44.44	1 11.11	1 11.11	0 0.00	3 33.33	9
LEFT FRONT (2)	7 17.95	16 41.03	1 2.56	1 2.56	14 35.90	39
RIGHT FRONT (3)	10 30.30	3 9.09	14 42.42	0 0.00	6 18.18	33
LEFT REAR (4)	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
RIGHT REAR (5)	0 0.00	0 0.00	3 100.00	0 0.00	0 0.00	3
REAR (6)	0 0.00	0 0.00	2 33.33	1 16.67	3 50.00	6
ROOF (7)	0 0.00	0 0.00	1 33.33	0 0.00	2 66.67	3
OTHER AREA (8)	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	1
TOTAL	21	21	22	2	29	95

Table A-2 AIS INJURY LEVELS BY EJECTAREA AND MANCOLL
1983 NONSPORT PASSENGER CARS

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TABLE OF EJECTAREA BY MANCOLL

EJECTAREA	EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)	MANCOLL	MANNER COLLISION					
FREQUENCY ROW PCT	NOT COLLISION	REAR END	HEAD ON	ANGLE	SIDE. ME DIR.	SA P. DIR.	SIDE. OP DIR.	TOTAL
WINDSHIELD (1)	66.67	0.00	11.11	22.22	0.00	0.00	0.00	9
LEFT FRONT (2)	64.10	0.00	10.26	25.64	0.00	0.00	0.00	39
RIGHT FRONT (3)	42.42	0.00	3.03	51.52	0.00	0.00	3.03	33
LEFT REAR (4)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	1
RIGHT REAR (5)	0.00	0.00	0.00	100.00	0.00	0.00	0.00	3
REAR (6)	66.67	16.67	0.00	16.67	0.00	0.00	0.00	6
ROOF (7)	66.67	0.00	0.00	0.00	33.33	0.00	0.00	3
OTHER AREA (8)	100.00	0.00	0.00	0.00	0.00	0.00	0.00	1
TOTAL	53	1	6	33	1	1	1	95

Table A-3 AIS INJURY LEVELS BY EJCTAREA AND HARMEV1
1983 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJCTAREA

HARMEV1	FIRST HARMFUL EVENT	EJCTAREA	EJECTION AREA (WINDSHIELD, LF, RF, LR, RR)													TOTAL
FREQUENCY ROW PCT	WINDSHIELD LD (1)	LEFT INT (2)	FRONT ONT (3)	RIGHT R (4)	LEFT REAR R (5)	RIGHT REAR AR (6)	ROOF (7)	OTHER AREA EA (8)								
1	1	9	12.50	2	0	0	1	2	1	16						
	6.25	56.25		0.00	0.00	6.25	12.50	6.25								
7	0	0	100.00	1	0	0	0	0	0	1						
	0.00	0.00		0.00	0.00	0.00	0.00	0.00								
10	0	1	0.00	0	0	0	0	0	0	1						
	0.00	100.00		0.00	0.00	0.00	0.00	0.00								
12	3	13	45.00	18	0	3	2	1	0	40						
	7.50	32.50		0.00	0.00	7.50	5.00	2.50	0.00							
13	0	1	50.00	1	0	0	0	0	0	2						
	0.00	50.00		0.00	0.00	0.00	0.00	0.00	0.00							
14	0	0	100.00	1	0	0	0	0	0	1						
	0.00	0.00		100.00	0.00	0.00	0.00	0.00	0.00							
22	0	1	0.00	0	0	0	0	0	0	1						
	0.00	100.00		0.00	0.00	0.00	0.00	0.00	0.00							
24	0	2	33.33	1	0	0	0	0	0	3						
	0.00	66.67		0.00	0.00	0.00	0.00	0.00	0.00							
26	0	0	100.00	1	0	0	0	0	0	1						
	0.00	0.00		100.00	0.00	0.00	0.00	0.00	0.00							
TOTAL	9	39	33	1	3	6	3	1		95						

(CONTINUED)

Table A-3 (Cont.)

AIS INJURY LEVELS BY EJECTAREA AND HARMEV1
1983 NONSPORT PASSENGER CARS

17:34 WEDNESDAY, JULY 16, 1986

TABLE OF HARMEV1 BY EJECTAREA

HARMEV1	FIRST HARMFUL EVENT	EJECTAREA	EJECTION AREA (WINDSHIELD, LF, RF, LR, RR)								
FREQUENCY ROW PCT	WINDSHIELD LD (1)	LEFT NT (2)	FRONT ONT (3)	RIGHT R (4)	REAR AR (5)	REAR REAR (6)	ROOF (7)	OTHER AREA EA (8)			
27	33.33	33.33	33.33	0.00	0.00	0.00	0.00	0.00	3		
30	0.00	66.67	33.33	0.00	0.00	0.00	0.00	0.00	3		
31	0.00	75.00	0.00	0.00	0.00	25.00	0.00	0.00	4		
32	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1		
33	0.00	50.00	25.00	0.00	0.00	25.00	0.00	0.00	4		
34	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	1		
35	0.00	0.00	50.00	0.00	0.00	50.00	0.00	0.00	2		
42	37.50	12.50	50.00	0.00	0.00	0.00	0.00	0.00	8		
43	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	3		
TOTAL	9	39	33	1	3	6	3	1	95		

TABLE OF EJECTMED BY IMPTYPE
VEHICLE'S MOST SEVERE IMPACT TYPE

EJECTMED	EJECTION MEDIUM	IMPTYPE	FRONT(1)	LEFT SID E(2)	RIGHT SI DE(3)	REAR (4)	OTHER IM PACT(5)	TOTAL
FREQUENCY ROW PCT								
DOOR	(1)		7 18.92	8 21.62	12 32.43	1 2.70	9 24.32	37
OPEN ROOF	(2)		0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	1
FIXED WINDOWS	(3)		4 25.00	1 6.25	3 18.75	1 6.25	7 43.75	16
ROLL DOWN TYPE	4		10 27.03	12 32.43	4 10.81	0 0.00	11 29.73	37
8			0 0.00	0 0.00	3 75.00	0 0.00	1 25.00	4
TOTAL			21	21	22	2	29	95

Table A-5 AIS INJURY LEVELS BY EJCTMED AND MANCOLL
1983 NONSPORT PASSENGER CARS

17:34 WEDNESDAY, JULY 16, 1986

TABLE OF EJCTMED BY MANCOLL

EJCTMED	EJECTION MEDIUM	MANCOLL	MANNER COLLISION									TOTAL
FREQUENCY ROW PCT	NOT COLLISION	REAR END	HEAD ON	ANGLE	SIDE. ME DIR.	SA P. DIR.	SIDE. OP					
DOOR (1)	18 48.65	0 0.00	2 5.41	17 45.95	0 0.00	0 0.00	0 0.00					37
OPEN ROOF (2)	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00					1
FIXED WINDOWS(3)	11 68.75	1 6.25	1 6.25	3 18.75	0 0.00	0 0.00	0 0.00					16
ROLL DOWN TYPE 4	22 59.46	0 0.00	3 8.11	11 29.73	0 0.00	0 2.70	1 2.70					37
8	1 25.00	0 0.00	0 0.00	2 50.00	1 25.00	1 0.00	0 0.00					4
TOTAL	53	1	6	33	1	1	1					95

Table A-6 AIS INJURY LEVELS BY EJCTMED AND HARMEV1
1983 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJCTMED

HARMEV1	FIRST HARMFUL EVENT	EJCTMED	EJECTION MEDIUM	TOTAL	
FREQUENCY ROW PCT	DOOR (1)	OPEN R00 F (2)	FIXED WI NDOWS(3)	ROLL DOW N TYPE 4	8
1	4 25.00	1 6.25	3 18.75	7 43.75	1 6.25
7	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00
10	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00
12	17 42.50	0 0.00	5 12.50	15 37.50	3 7.50
13	2 100.00	0 0.00	0 0.00	0 0.00	0 0.00
14	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00
22	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00
24	2 66.67	0 0.00	0 0.00	1 33.33	0 0.00
26	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00
TOTAL	37	1	16	37	4

Table A-6 (Cont.) AIS INJURY LEVELS BY EJCTMED AND HARMEV1
1983 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJCTMED

HARMEV1	FIRST HARMFUL EVENT	EJCTMED	EJECTION MEDIUM	TOTAL		
FREQUENCY ROW PCT	DOOR (1)	OPEN ROO F (2)	FIXED WI NDOWS(3)	ROLL DOW N TYPE 4	8	TOTAL
27	1 33.33	0 0.00	1 33.33	1 33.33	0 0.00	3
30	2 66.67	0 0.00	0 0.00	1 33.33	0 0.00	3
31	0 0.00	0 0.00	1 25.00	3 75.00	0 0.00	4
32	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	1
33	2 50.00	0 0.00	1 25.00	1 25.00	0 0.00	4
34	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
35	0 0.00	0 0.00	1 50.00	1 50.00	0 0.00	2
42	4 50.00	0 0.00	3 37.50	1 12.50	0 0.00	8
43	0 0.00	0 0.00	0 0.00	3 100.00	0 0.00	3
TOTAL	37	1	16	37	4	95

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Table A-7 AIS INJURY LEVELS BY MEDSTA AND IMPTYPE
1983 NONSPORT PASSENGER CARS

TABLE OF MEDSTA BY IMPTYPE

MEDSTA	MEDIUM STATUS	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE					TOTAL
FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SIDE DE(3)	RIGHT SIDE REAR (4)	OTHER IM PACT(5)				
OPEN (1)	2 10.53	6 31.58	3 15.79	0 0.00	8 42.11			19
SEPARATION (2)	2 20.00	1 10.00	2 20.00	0 0.00	5 50.00			10
CLOSED (3)	16 26.23	13 21.31	15 24.59	2 3.28	15 24.59			61
RIPPED OPEN (4)	0 0.00	0 0.00	2 66.67	0 0.00	1 33.33			3
TOTAL	20	20	22	2	29			93

Table A-8 AIS INJURY LEVELS BY MEDSTA AND MANCOLL
1983 NONSPORT PASSENGER CARS

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TABLE OF MEDSTA BY MANCOLL

MEDSTA	MEDIUM STATUS	MANCOLL	MANNER COLLISION					TOTAL
FREQUENCY ROW PCT	NOT COLLISION	REAR END	HEAD ON	ANGLE	SIDE. ME	SAI DIR.		
OPEN (1)	12 63.16	0 0.00	0 0.00	7 36.84	0 0.00	0 0.00	19	
SEPARATION (2)	7 70.00	0 0.00	0 0.00	3 30.00	0 0.00	0 0.00	10	
CLOSED (3)	33 54.10	1 1.64	5 8.20	22 36.07	0 0.00	0 0.00	61	
RIPPED OPEN (4)	1 33.33	0 0.00	0 0.00	1 33.33	1 33.33	1 33.33	3	
TOTAL	53	1	5	33	1	1	93	

Table A-9 AIS INJURY LEVELS BY MEDSTA AND HARMEV1
1983 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY MEDSTA

HARMEV1	FIRST HARMFUL EVENT	MEDSTA	MEDIUM STATUS				
FREQUENCY ROW PCT	OPEN (1)	SEPARATI ON (2)	CLOSED (3)	IRIPPED OI PEN (4)			
1	7 43.75	1 6.25	7 43.75	1 6.25			
7	0 0.00	0 0.00	1 100.00	0 0.00			
10	0 0.00	0 0.00	1 100.00	0 0.00			
12	6 15.79	3 7.89	27 71.05	2 5.26			
13	1 50.00	0 0.00	1 50.00	0 0.00			
14	0 0.00	0 0.00	1 100.00	0 0.00			
22	0 0.00	0 0.00	1 100.00	0 0.00			
24	1 33.33	0 0.00	2 66.67	0 0.00			
26	0 0.00	0 0.00	1 100.00	0 0.00			
TOTAL	19	10	61	3			

CONTINUED)

Table A-9 (Cont.) AIS INJURY LEVELS BY MEDSTA AND HARMEV1
1983 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY MEDSTA

HARMEV1	FIRST HARMFUL EVENT	MEDSTA	MEDIUM STATUS	
FREQUENCY ROW PCT	OPEN (1)	SEPARATI ON (2)	CLOSED (3)	RIPPED OI PEN (4)
27	0 0.00	1 33.33	2 66.67	0 0.00
30	0 0.00	0 0.00	3 100.00	0 0.00
31	2 50.00	1 25.00	1 25.00	0 0.00
32	0 0.00	1 100.00	0 0.00	0 0.00
33	0 0.00	1 25.00	3 75.00	0 0.00
34	0 0.00	0 0.00	1 100.00	0 0.00
35	0 0.00	1 50.00	1 50.00	0 0.00
42	0 0.00	1 12.50	7 87.50	0 0.00
43	2 66.67	0 0.00	1 33.33	0 0.00
TOTAL	19	10	61	3
				93

Table A-10 (Cont.) AIS INJURY LEVELS BY INJSOU1 AND B0SYREG1
1983 NONSPORT PASSENGER CARS

TABLE OF INJSOU1 BY BODYREG1

INJSOU1	INJURY SOURCE ONE	BODYREG1	OIC BODY REGION ONE																	TOTAL
FREQUENCY ROW PCT	N	IP	IQ	IR	IS	IT	IU	IW												
1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6
2	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
3	0	0.00	0.00	0.00	0.00	12.50	1	12.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8
5	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4
11	1	20.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5
12	0	0.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2
13	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
16	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5
23	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
33	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
TOTAL	4	7	1	1	1	4	6	2	2	2	6	2	2	2	2	2	2	2	2	104

INJURY SOURCE ONE	BODYREG1	OIC BODY REGION ONE
TNJJSOU1		

FREQUENCY ROW PCT	N	P	Q	R	S	T	U	W	TOTAL
34	0	0.00	0	0	0	0	0	0	1
45	0	0.00	0	0	0	0	0	0	1
53	0	0.00	0	0	0	0	1	0	2
77	0	0.00	0	0	0	0	0	0	1
86	1	4.55	4	1	1	2	1	0	22
87	0	0.00	0	0	0	0	0	0	1
89	0	0.00	0	0	0	0	0	0	1
90	1	50.00	0	0	0	0	0	0	2
97	1	2.56	2	0	0	1	3	2	39
TOTAL	4	7	1	1	1	4	6	2	104

Table A-11 FATALITIES BY EJECTAREA AND IMPTYPE
1983 NONSPORT PASSENGER CARS

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TABLE OF EJECTAREA BY IMPTYPE

EJECTAREA	EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE		
FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SIDE DE(3)	RIGHT SIDE PACT(5)	OTHER IM PACT(5)	TOTAL
WINDSHIELD (1)	0 0.00	0 0.00	1 33.33	2 66.67	3
LEFT FRONT (2)	0 0.00	3 75.00	0 0.00	1 25.00	4
RIGHT FRONT (3)	0 0.00	0 0.00	3 60.00	2 40.00	5
RIGHT REAR (5)	2 100.00	0 0.00	0 0.00	0 0.00	2
REAR (6)	0 0.00	0 0.00	2 100.00	0 0.00	2
ROOF (7)	0 0.00	0 0.00	1 100.00	0 0.00	1
TOTAL	2	3	7	5	17

Table A-12 FATALITIES BY EJECTAREA AND MANCOLL
1983 NONSPORT PASSENGER CARS

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TABLE OF EJECTAREA BY MANCOLL

EJECTAREA	FREQUENCY ROW PCT	EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)				MANCOLL	MANNER COLLISION
		NOT COLLISION	ANGLE	SIDE, SA IME DIR.	TOTAL		
WINDSHIELD	(1)	3	0	0	3		
		100.00	0.00	0.00			
LEFT FRONT	(2)	3	1	0	4		
		75.00	25.00	0.00			
RIGHT FRONT	(3)	2	3	0	5		
		40.00	60.00	0.00			
RIGHT REAR	(5)	2	0	0	2		
		100.00	0.00	0.00			
REAR	(6)	1	1	0	2		
		50.00	50.00	0.00			
ROOF	(7)	0	0	1	1		
		0.00	0.00	100.00			
TOTAL		11	5	1	17		

Table A-13 FATALITIES BY EJECTAREA AND HARMEV1
1983 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJECTAREA

HARMEV1	FIRST HARMFUL EVENT	EJCTAREA	EJECTION AREA (WINDSHIELD, LF, RF, LR, RR)	TOTAL			
FREQUENCY ROW PCT	WINDSHIE LD (1)	LEFT NT (2)	RIGHT FR ONT (3)	RIGHT RE AR (5)	REAR REAR (6)	ROOF (7)	TOTAL
1	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
10	0 0.00	0 0.00	0 0.00	2 100.00	0 0.00	0 0.00	2
12	0 0.00	1 20.00	2 40.00	0 0.00	1 20.00	1 20.00	5
13	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
26	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
27	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
31	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
33	0 0.00	1 50.00	0 0.00	0 0.00	1 50.00	0 0.00	2
38	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
42	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
43	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
TOTAL	3	4	5	2	2	1	17

TABLE OF EJCTMED BY IMPTYPE

EJCTMED	EJECTION	MEDIUM	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE				
FREQUENCY ROW PCT								
		FRONT(1)	LEFT E(2)	SID DE(3)	RIGHT SI	OTHER PACT(5)	IM	TOTAL
DOOR	(1)	28.57	2	28.57	2	1	14.29	7
FIXED WINDOWS	(3)	0.00	0	0.00	3	2	40.00	5
ROLL DOWN TYPE	4	0.00	0	0.00	1	2	66.67	3
8		0.00	0	1	33.33	1	0	2
TOTAL		2	3	7	5			17

Table A-15 FATALITIES BY EJCTMED AND MANCOLL
1983 NONSPORT PASSENGER CARS

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TABLE OF EJCTMED BY MANCOLL

EJCTMED	EJECTION MEDIUM	MANCOLL	MANNER COLLISION	
FREQUENCY ROW PCT	NOT COLLISION	ANGLE	SIDE. SA ME DIR.	TOTAL
DOOR (1)	4 57.14	3 42.86	0 0.00	7
FIXED WINDOWS(3)	4 80.00	1 20.00	0 0.00	5
ROLL DOWN TYPE 4	2 66.67	1 33.33	0 0.00	3
8	1 50.00	0 0.00	1 50.00	2
TOTAL	11	5	1	17

Table A-16 FATALITIES BY EJECTMENT AND HARMEV1
1983 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJECTMENT

HARMEV1	FIRST HARMFUL EVENT	EJECTMENT	EJECTION MEDIUM	TOTAL
FREQUENCY ROW PCT	DOOR (1)	FIXED WINDOW DOWN (2)	ROLL OVER TYPE 4	8
1	100.00	0.00	0.00	0.00
10	100.00	0.00	0.00	0.00
12	60.00	20.00	0.00	20.00
13	0.00	0.00	100.00	0.00
26	0.00	100.00	0.00	0.00
27	0.00	100.00	0.00	0.00
31	100.00	0.00	0.00	0.00
33	0.00	50.00	0.00	50.00
38	0.00	0.00	100.00	0.00
42	0.00	100.00	0.00	0.00
43	0.00	0.00	100.00	0.00
TOTAL	7	5	3	2

Table A-17

FATALITIES BY MEDSTA AND IMPTYPE
1983 NONSPORT PASSENGER CARS

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TABLE OF MEDSTA BY IMPTYPE

MEDSTA	MEDIUM STATUS	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE				
FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SIDE E(2)	RIGHT SIDE DE(3)	OTHER IM PACT(5)	TOTAL		
OPEN (1)	0 0.00	1 33.33	2 66.67	0 0.00	3		
SEPARATION (2)	0 0.00	0 0.00	3 60.00	2 40.00	5		
CLOSED (3)	2 33.33	1 16.67	1 16.67	2 33.33	6		
RIPPED OPEN (4)	0 0.00	1 33.33	2 66.67	0 0.00	3		
TOTAL	2	3	8	4	17		

Table A-18 FATALITIES BY MEDSTA AND MANCOLL
1983 NONSPORT PASSENGER CARS

TABLE OF MEDSTA BY MANCOLL						
MEDSTA	MEDIUM STATUS	MANCOLL	MANNER COLLISION			
FREQUENCY ROW PCT	NOT COLLISION	ANGLE	SIDE- ME DIR.	SAI	TOTAL	
OPEN (1)	1 33.33	2 66.67	0 0.00		3	
SEPARATION (2)	4 80.00	1 20.00	0 0.00		5	
CLOSED (3)	4 66.67	2 33.33	0 0.00		6	
RIPPED OPEN (4)	1 33.33	1 33.33	1 33.33		3	
TOTAL	10	6	1		17	

Table A-19

FATALITIES BY MEDSTA AND HARMEV1
1983 NONSPORT PASSENGER CARS

17:34 WEDNESDAY, JULY 16, 1986

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TABLE OF HARMEV1 BY MEDSTA

HARMEV1	FIRST HARMFUL EVENT	MEDSTA	MEDIUM STATUS
FREQUENCY/ ROW PCT	OPEN (1) ON (2)	CLOSED (3) PEN (4)	TOTAL
1	0 0.00	1 100.00	1
10	0 0.00	2 100.00	2
12	2 33.33	1 16.67	6
13	0 0.00	1 100.00	1
26	0 0.00	0 0.00	1
27	0 0.00	0 0.00	1
31	1 100.00	0 0.00	1
33	0 0.00	1 50.00	2
42	0 0.00	0 0.00	1
43	0 0.00	1 100.00	1
TOTAL	3	5	17

Table A-20 FATALITIES BY INJSOU1 AND BODYREG1
1983 NONSPORT PASSENGER CARS

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TABLE OF INJSOU1 BY BODYREG1

INJSOU1	FREQUENCY ROW PCT	INJURY SOURCE ONE	IF	IH	IM	IN	IU	TOTAL
11	2 66.67		0 0.00	0 0.00	0 0.00	0 0.00	1 33.33	3
32	0 0.00		0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
77	1 100.00		0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
86	0 0.00		1 50.00	1 50.00	0 0.00	0 0.00	0 0.00	2
87	0 0.00		0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
97	4 26.67		1 6.67	5 33.33	1 6.67	0 0.00	4 26.67	15
TOTAL	7	2	8	1	1	4	23	

Table A-21 ACCIDENT MODE BY EJECTION AND BODYTYPE
1983 NONSPORTS MULTICAR ACCIDENTS
EJECTION=COMPLETE (1) 11:24 SATURDAY, DECEMBER 14, 1985

BODYTYPE	VEHICLE BODY TYPE CODE			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
CONVERTIBLE	1	1	2.857	2.857
2-DR SEDAN	22	23	62.857	65.714
3/2 DR HB	7	30	20.000	85.714
4-DR SEDAN	3	33	8.571	94.286
STATION WAGON	2	35	5.714	100.000

ACCIDENT MODE BY EJECTION AND BODYTYPE
1983 NONSPORTS MULTICAR ACCIDENTS
EJECTION=PARTIAL (2) 11:24 SATURDAY, DECEMBER 14, 1985

BODYTYPE	VEHICLE BODY TYPE CODE			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
2-DR SEDAN	8	8	50.000	50.000
3/2 DR HB	5	13	31.250	81.250
4-DR SEDAN	1	14	6.250	87.500
5/4 DR SEDAN	1	15	6.250	93.750
STATION WAGON	1	16	6.250	100.000

Table A-22 ACCIDENT MODE BY OBJECT1 AND BODYTYPE
1983 NONSPORTS PASSENGER CAR ACCIDENTS
EJECTION=COMPLETE (1)

TABLE OF OBJCONT1 BY BODYTYPE

OBJCONT1	OBJECT CONTACT	BODYTYPE	VEHICLE BODY TYPE CODE	TOTAL			
FREQUENCY ROW PCT	CONVERTIBLE	2-DR VAN	SEDAN B	3/2 DR H	4-DR VAN	SEDAN WAGON	TOTAL
31	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
32	0 0.00	3 100.00	0 0.00	0 0.00	0 0.00	0 0.00	3
33	0 0.00	3 50.00	0 0.00	0 0.00	3 50.00	0 0.00	6
35	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
43	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
44	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
47	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	1
52	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
57	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
59	0 0.00	1 33.33	2 66.67	0 0.00	0 0.00	0 0.00	3
63	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
66	1 2.94	23 67.65	4 11.76	3 8.82	3 8.82	3 8.82	34
67	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
68	0 0.00	1 50.00	0 0.00	0 0.00	1 50.00	0 0.00	2
72	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2 100.00	2
TOTAL	2	36	8	8	8	5	59

1983 NONSPORTS PASSENGER CAR ACCIDENTS
EJECTION=PARTIAL (2)

TABLE OF OBJCONT1 BY BODYTYPE

OBJCONT1	OBJECT CONTACT	BODYTYPE		VEHICLE BODY TYPE CODE		TOTAL
FREQUENCY	2-DR SED	3/2 DR	H	4-DR SED	STATION WAGON	OTHER AU TO TYPE
ROW PCT	AN	B		AN		
33	2		0	1	1	0
	50.00		0.00	25.00	25.00	0.00
40	2		0	0	0	0
	100.00		0.00	0.00	0.00	0.00
41	0		0	2	0	0
	0.00		0.00	100.00	0.00	0.00
49	0		0	0	0	1
	0.00		0.00	0.00	0.00	100.00
57	1		0	0	0	0
	100.00		0.00	0.00	0.00	0.00
66	3		3	1	0	0
	42.86		42.86	14.29	0.00	0.00
TOTAL	8		3	4	1	1

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Table A-24 ACCIDENT MODES BY EJECTION AND BODYTYPE
1983 NONSPORT PASSENGER CAR ACCIDENTS
EJECTION=COMPLETE (1)

BODYTYPE	VEHICLE BODY TYPE CODE			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
2-DR SEDAN	12	12	60.000	60.000
3/2 DR HB	6	18	30.000	90.000
4-DR SEDAN	2	20	10.000	100.000

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ACCIDENT MODES BY EJECTION AND BODYTYPE
1983 NONSPORT PASSENGER CAR ACCIDENTS
EJECTION=PARTIAL (2)

BODYTYPE	VEHICLE BODY TYPE CODE			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
2-DR SEDAN	5	5	83.333	83.333
5/4 DR SEDAN	1	6	16.667	100.000

Table A-25 AIS INJURY LEVELS BY EJCTAREA AND IMPTYPE
1982 NONSPORT PASSENGER CARS

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TABLE OF EJCTAREA BY IMPTYPE

EJCTAREA EJECTION AREA (WINDSHIELD,LF,RF,LR,RR) IMPTYPE VEHICLE'S MOST SEVERE IMPACT TYPE

FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SIDE DE(3)	RIGHT SIDE DE(3)	REAR (4)	OTHER IM PACT(5)	TOTAL
WINDSHIELD (1)	2 20.00	2 20.00	3 30.00	0 0.00	3 30.00	10
LEFT FRONT (2)	6 20.69	11 37.93	1 3.45	1 3.45	10 34.48	29
RIGHT FRONT (3)	5 20.83	1 4.17	9 37.50	0 0.00	9 37.50	24
LEFT REAR (4)	1 50.00	0 0.00	0 0.00	0 0.00	1 50.00	2
RIGHT REAR (5)	0 0.00	0 0.00	3 100.00	0 0.00	0 0.00	3
REAR (6)	1 10.00	0 0.00	3 30.00	1 10.00	5 50.00	10
ROOF (7)	1 20.00	0 0.00	0 0.00	0 0.00	4 80.00	5
TOTAL	16	14	19	2	32	83

Table A-26 AIS INJURY LEVELS BY EJECTAREA AND MANCOLL
1982 NONSPORT PASSENGER CARSTABLE OF EJECTAREA BY MANCOLL
EJECTAREA EJECTION AREA (WINDSHIELD, LF, RF, LR, RR) MANCOLL MANNER COLLISION

FREQUENCY ROW PCT	NOT COLLISION	REAR END	HEAD ON	ANGLE	TOTAL
WINDSHIELD (1)	6	0	0	4	10
	60.00	0.00	0.00	40.00	
LEFT FRONT (2)	19	1	0	9	29
	65.52	3.45	0.00	31.03	
RIGHT FRONT (3)	17	0	2	5	24
	70.83	0.00	8.33	20.83	
LEFT REAR (4)	2	0	0	0	2
	100.00	0.00	0.00	0.00	
RIGHT REAR (5)	0	0	0	3	3
	0.00	0.00	0.00	100.00	
REAR (6)	8	1	0	1	10
	80.00	10.00	0.00	10.00	
ROOF (7)	5	0	0	0	5
	100.00	0.00	0.00	0.00	
TOTAL	57	2	2	22	83

HARMEV1	FIRST HARMFUL EVENT	EJCTAREA	EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)
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FREQUENCY ROW PCT	WINDSHIELD		LEFT FRONT		RIGHT FRONT		LEFT REAR		RIGHT REAR		ROOF	
	LD (1)	INT (2)	INT (2)	FR (3)	FR (3)	R (4)	REAR (5)	REAR (5)	REAR (6)	REAR (7)	ROOF (7)	
1	15.00	3	7	4	20.00	0.00	0.00	0	20.00	4	2	
12	16.00	4	10	6	24.00	0.00	0.00	3	8.00	2	0	
13	0.00	0	0	1	100.00	0.00	0.00	0	0.00	0	0	
14	0.00	0	0	1	50.00	0.00	0.00	0	50.00	1	0	
17	0.00	0	0	1	100.00	0.00	0.00	0	0.00	0	0	
23	0.00	0	1	0	0.00	0.00	0.00	0	0.00	0	0	
24	0.00	0	2	0	0.00	0.00	0.00	0	0.00	0	0	
26	0.00	0	1	0	0.00	0.00	0.00	0	0.00	0	1	
29	0.00	0	0	1	100.00	0.00	0.00	0	0.00	0	0	
TOTAL	10	29	29	24	24	2	3	10	5	83		

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Table A-27 (Cont.) AIS INJURY LEVELS BY EJECTAREA AND HARMEV1
1982 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJECTAREA

HARMEV1	FIRST HARMFUL EVENT	EJECTAREA	EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)										
FREQUENCY ROW PCT	WINDSHIELD LD (1)	LEFT INT (2)	FRONT ONT (3)	RIGHT R (4)	REAR AR (5)	REAR AR (6)	ROOF (7)						
30	0	1	0	0	0	0	0	1					
	0.00	100.00	0.00	0.00	0.00	0.00	0.00						
31	0	1	0	0	0	0	0	1					
	0.00	100.00	0.00	0.00	0.00	0.00	0.00						
32	1	1	0	0	0	1	1	4					
	25.00	25.00	0.00	0.00	0.00	25.00	25.00						
33	0	1	3	0	0	0	0	4					
	0.00	25.00	75.00	0.00	0.00	0.00	0.00						
34	0	0	4	1	0	1	1	7					
	0.00	0.00	57.14	14.29	0.00	14.29	14.29						
35	1	0	1	0	0	0	0	2					
	50.00	0.00	50.00	0.00	0.00	0.00	0.00						
38	0	1	1	0	0	0	0	2					
	0.00	50.00	50.00	0.00	0.00	0.00	0.00						
42	1	3	0	1	0	1	0	6					
	16.67	50.00	0.00	16.67	0.00	16.67	0.00						
43	0	0	1	0	0	0	0	1					
	0.00	0.00	100.00	0.00	0.00	0.00	0.00						
TOTAL	10	29	24	2	3	10	5	83					

Table A-28 AIS INJURY LEVELS BY EJCTMED AND IMPTYPE
1982 NONSPORT PASSENGER CARS

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TABLE OF EJCTMED BY IMPTYPE

EJCTMED	EJECTION MEDIUM	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE					TOTAL
FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SIDE E(2)	RIGHT SIDE DE(3)	REAR (4) PACT(5)	OTHER IM PACT(5)			
DOOR (1)	9 27.27	10 30.30	6 18.18	1 3.03	7 21.21			33
OPEN ROOF (2)	0 0.00	0 0.00	0 0.00	0 0.00	2 100.00			2
FIXED WINDOWS(3)	4 20.00	2 10.00	4 20.00	1 5.00	9 45.00			20
ROLL DOWN TYPE 4	2 9.09	1 4.55	7 31.82	0 0.00	12 54.55			22
HINGED TYPE (5)	0 0.00	0 0.00	2 100.00	0 0.00	0 0.00			2
8	1 33.33	0 0.00	0 0.00	0 0.00	2 66.67			3
TOTAL	16	13	19	2	32			82

Table A-29 AIS INJURY LEVELS BY EJECTED AND MANCOLL
1982 NONSPORT PASSENGER CARS

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TABLE OF EJECTED BY MANCOLL

EJECTED FREQUENCY ROW PCT	EJECTION MEDIUM	MANCOLL	MANNER COLLISION	NOT COLLISION	REAR END	HEAD ON	ANGLE	TOTAL
DOOR (1)	16 48.48	1 3.03	2 6.06	14 42.42				33
OPEN ROOF (2)	2 100.00	0 0.00	0 0.00	0 0.00				2
FIXED WINDOWS(3)	14 70.00	1 5.00	0 0.00	5 25.00				20
ROLL DOWN TYPE 4	19 86.36	0 0.00	0 0.00	3 13.64				22
HINGED TYPE (5)	2 100.00	0 0.00	0 0.00	0 0.00				2
8	3 100.00	0 0.00	0 0.00	0 0.00				3
TOTAL	56	2	2	22				82

Table A-30 AIS INJURY LEVELS BY EJCTMED AND HARMEV1
1982 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJCTMED

HARMEV1	FIRST HARMFUL EVENT	EJCTMED	EJECTION MEDIUM	TOTAL			
FREQUENCY ROW PCT	DOOR (1)	OPEN ROO F (2)	FIXED WI NDOWS(3)	ROLL DOWN TYPE 4	HINGED T TYPE (5)	8	TOTAL
1	4 21.05	2 10.53	7 36.84	6 31.58	0 0.00	0 0.00	19
12	16 64.00	0 0.00	6 24.00	3 12.00	0 0.00	0 0.00	25
13	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
14	1 50.00	0 0.00	1 50.00	0 0.00	0 0.00	0 0.00	2
17	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	1
23	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
24	1 50.00	0 0.00	0 0.00	1 50.00	0 0.00	0 0.00	2
26	0 0.00	0 0.00	0 0.00	1 50.00	0 0.00	1 50.00	2
29	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	1
TOTAL	33	2	20	22	2	3	82

>CONTINUED)

Table A-30(Cont.) AIS INJURY LEVELS BY EJCTMED AND HARMEV1
1982 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJCTMED

HARMEV1	FIRST HARMFUL EVENT	EJCTMED	EJECTION MEDIUM	TOTAL			
FREQUENCY ROW PCT	DOOR (1)	OPEN ROOF (2)	FIXED WINDOW (3)	ROLL OVER (4)	DOWN (5)	HINGED (6)	TOTAL
30	100.00	0.00	0.00	0.00	0.00	0.00	1
31	100.00	0.00	0.00	0.00	0.00	0.00	1
32	25.00	0.00	25.00	0.00	25.00	25.00	4
33	25.00	0.00	0.00	75.00	0.00	0.00	4
34	28.57	0.00	28.57	28.57	0.00	14.29	7
35	0.00	0.00	50.00	50.00	0.00	0.00	2
38	50.00	0.00	0.00	50.00	0.00	0.00	2
42	33.33	0.00	33.33	16.67	16.67	0.00	6
43	0.00	0.00	0.00	100.00	0.00	0.00	1
TOTAL	33	2	20	22	2	3	82

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Table A-31 AIS INJURY LEVELS BY MEDSTA AND IMPTYPE
1982 NONSPORT PASSENGER CARS

TABLE OF MEDSTA BY IMPTYPE

MEDSTA	MEDIUM STATUS	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE				
FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SIDE DE(3)	RIGHT SIDE REAR (4)	OTHER IM PACT(5)	TOTAL		
OPEN (1)	2 18.18	1 9.09	1 9.09	0 0.00	7 63.64	11	
SEPARATION (2)	4 28.57	2 14.29	4 28.57	0 0.00	4 28.57	14	
CLOSED (3)	8 15.38	8 15.38	14 26.92	2 3.85	20 38.46	52	
RIPPED OPEN (4)	1 25.00	2 50.00	0 0.00	0 0.00	1 25.00	4	
TOTAL	15	13	19	2	32	81	

Table A-32 AIS INJURY LEVELS BY MEDSTA AND MANCOLL
1982 NONSPORT PASSENGER CARS

TABLE OF MEDSTA BY MANCOLL

MEDSTA	MEDIUM STATUS	MANCOLL	MANNER COLLISION	TOTAL
FREQUENCY ROW PCT	NOT COLLISION	REAR END	HEAD ON	ANGLE
OPEN (1)	10 90.91	0 0.00	0 0.00	1 9.09
SEPARATION (2)	9 64.29	0 0.00	0 0.00	5 35.71
CLOSED (3)	34 65.38	2 3.85	1 1.92	15 28.85
RIPPED OPEN (4)	3 75.00	0 0.00	0 0.00	1 25.00
TOTAL	56	2	1	22

Table A-33 AIS INJURY LEVELS BY MEDSTA AND HARMEV1
1982 NONSPORT PASSENGER CARS

17:01 FRIDAY, JULY 18, 1986 11

TABLE OF HARMEV1 BY MEDSTA

HARMEV1	FIRST HARMFUL EVENT	MEDSTA	MEDIUM STATUS	
FREQUENCY ROW PCT	OPEN (1) ON (2)	SEPARATI ON (2)	CLOSED (3)	RIPPED O PEN (4)
1	3 15.79	4 21.05	12 63.16	0 0.00
12	1 4.00	5 20.00	18 72.00	1 4.00
14	0 0.00	1 50.00	1 50.00	0 0.00
17	0 0.00	0 0.00	1 100.00	0 0.00
23	0 0.00	0 0.00	1 100.00	0 0.00
24	0 0.00	0 0.00	1 50.00	1 50.00
26	1 50.00	0 0.00	0 0.00	1 50.00
29	0 0.00	0 0.00	1 100.00	0 0.00
30	0 0.00	0 0.00	1 100.00	0 0.00
TOTAL	11	14	52	4
				81

CONTINUED

Table A-33(Cont.) AIS INJURY LEVELS BY MEDSTA AND HARMEV1
1982 NONSPORT PASSENGER CARS

17:01 FRIDAY, JULY 18, 1986 12

TABLE OF HARMEV1 BY MEDSTA

HARMEV1	FIRST HARMFUL EVENT	MEDSTA	MEDIUM STATUS		
FREQUENCY ROW PCT	OPEN (1)	SEPARATI ON (2)	CLOSED (3)	RIPPED 0 PEN (4)	TOTAL
31	0.00	0	1	0	1
32	0.00	25.00	50.00	25.00	6
33	75.00	0	1	0	6
34	28.57	0	5	0	7
35	0.00	50.00	1	0	2
38	0.00	0	2	0	2
42	16.67	33.33	3	0	6
43	0.00	0	1	0	1
TOTAL	11	44	52	4	81

Table A-34 AIS INJURY LEVELS BY INJSOU1 AND B0SYREG1
1982 NONSPORT PASSENGER CARS

17:01 FRIDAY, JULY 18, 1986 25

TABLE OF INJSOU1 BY BODYREG1

INJSOU1	INJURY SOURCE ONE	BODYREG1	OIC	BODY REGION ONE																TOTAL
FREQUENCY																				
ROW PCT	A	B	C	E	F	H	I	K	L	N										
1	0.00	0.00	0.00	0.00	0.00	50.00	1	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2
2	0.00	0.00	0.00	0.00	0.00	100.00	0	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
3	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2
5	0.00	0.00	100.00	1	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
11	0.00	0.00	20.00	1	0.00	20.00	1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5
13	0.00	0.00	0.00	0.00	0.00	50.00	1	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2
16	0.00	0.00	0.00	0.00	25.00	0.00	0	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4
33	0.00	0.00	0.00	0.00	0.00	0.00	0	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2
34	0.00	0.00	0.00	0.00	0.00	50.00	0	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2
51	0.00	0.00	0.00	0.00	0.00	33.33	0	1	33.33	0.00	1	1	33.33	0.00	0.00	0.00	0.00	0.00	0.00	3
63	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
86	8.33	0.00	0.00	0.00	0.00	41.67	0	5	0.00	0.00	1	1	8.33	0.00	0.00	0.00	0.00	0.00	0.00	12
87	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
90	0.00	0.00	0.00	0.00	100.00	0.00	1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
97	2.08	10.42	2.08	1	0.00	8.33	4	14	0.00	0.00	0.00	0.00	4.17	0.00	0.00	0.00	0.00	0.00	0.00	48
TOTAL	2	5	3	1	1	8	29	29	1	3	9									87

CONTINUED

Table A-34 (Cont.) AIS INJURY LEVELS BY INJSOU1 AND BODYREG1
1982 NONSPORT PASSENGER CARS

17:01 FRIDAY, JULY 18, 1986

TABLE OF INJSOU1 BY BODYREG1

INJSOU1	INJURY SOURCE ONE	BODYREG1	OIC BODY REGION ONE													TOTAL
FREQUENCY ROW PCT	0	IP	IQ	IR	IS	IT	IU	IW	Y							
1	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	2
2	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	2
5	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	1
11	0	0.00	0	1	0	1	0	0	0	0	0	0	0	0	0	5
13	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	2
16	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	4
33	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	2
34	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	2
51	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	3
63	0	0.00	0	0	0	0	1	0	0	0	0	0	0	0	0	1
86	0	0.00	0	0	2	1	0	0	0	0	0	0	0	0	0	12
87	0	0.00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
90	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	1
97	2	4.17	2	1	1	2	0	6	0	0	0	0	0	0	0	46
TOTAL	2	4.17	3	2	3	4	1	6	4	0	0	0	0	0	0	87

Table A-35 FATALITIES BY EJECTAREA AND IMPTYPE
1982 NONSPORT PASSENGER CARS

17:01 FRIDAY, JULY 18, 1986 13

TABLE OF EJECTAREA BY IMPTYPE

EJECTAREA	EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)				IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE
FREQUENCY ROW PCT	FRONT(1)		LEFT SIDE E(2)	RIGHT SIDE DE(3)	OTHER IMPACT PACT(5)	TOTAL
WINDSHIELD (1)	3	1	16.67	0.00	2	6
LEFT FRONT (2)	2	1	16.67	0.00	3	6
RIGHT FRONT (3)	0	1	25.00	1	2	4
LEFT REAR (4)	0	3	100.00	0.00	0	3
RIGHT REAR (5)	0	0	0.00	1	0	1
REAR (6)	0	0	0.00	0	1	1
TOTAL	5	6		2	8	21

Table A-36

FATALITIES BY EJECTAREA AND MANCOLL
1982 NONSPORT PASSENGER CARS

17:01 FRIDAY, JULY 18, 1982

TABLE OF EJECTAREA BY MANCOLL

EJECTAREA	FREQUENCY ROW PCT	EJECTION AREA (WINDSHIELD, LF, RF, LR, RR)	MANCOLL	MANNER COLLISION	TOTAL
WINDSHIELD (1)		NOT COLLISION			
		4	0	2	6
		66.67	0.00	33.33	
LEFT FRONT (2)		4	1	1	6
		66.67	16.67	16.67	
RIGHT FRONT (3)		3	0	1	4
		75.00	0.00	25.00	
LEFT REAR (4)		0	0	3	3
		0.00	0.00	100.00	
RIGHT REAR (5)		1	0	0	1
		100.00	0.00	0.00	
REAR (6)		1	0	0	1
		100.00	0.00	0.00	
TOTAL		13	1	7	21

Table A-37 FATALITIES BY EJECTAREA AND HARMEV1
1982 NONSPORT PASSENGER CARS

TABLE OF HARMEV1 BY EJECTAREA

HARMEV1 FIRST HARMFUL EVENT EJECTAREA EJECTION AREA (WINDSHIELD, LF, RF, LR, RR)

FREQUENCY ROW PCT	WINDSHIELD LD (1)	LEFT INT (2)	FRONT ONT (3)	RIGHT R (4)	REAR AR (5)	REAR (6)	TOTAL
1	1	1	0	0	0	1	3
	33.33	33.33	0.00	0.00	0.00	33.33	
12	2	2	1	3	0	0	8
	25.00	25.00	12.50	37.50	0.00	0.00	
24	0	1	1	0	0	0	2
	0.00	50.00	50.00	0.00	0.00	0.00	
31	1	0	0	0	0	0	1
	100.00	0.00	0.00	0.00	0.00	0.00	
32	1	0	0	0	0	0	1
	100.00	0.00	0.00	0.00	0.00	0.00	
33	0	2	0	0	0	0	2
	0.00	100.00	0.00	0.00	0.00	0.00	
40	0	0	1	0	0	0	1
	0.00	0.00	100.00	0.00	0.00	0.00	
42	1	0	0	0	0	0	1
	100.00	0.00	0.00	0.00	0.00	0.00	
43	0	0	1	0	1	0	2
	0.00	0.00	50.00	0.00	50.00	0.00	
TOTAL	6	6	4	3	1	1	21

Table A-38 FATALITIES BY EJECTED AND IMPTYPE
1982 NONSPORT PASSENGER CARS

TABLE OF EJECTED BY IMPTYPE
VEHICLE'S MOST SEVERE IMPACT TYPE

EJECTED FREQUENCY ROW PCT	EJECTION MEDIUM	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE	TOTAL
	FRONT(1) E(2)	LEFT SID DE(3)	RIGHT SI PACT(5)	
DOOR (1)	2 33.33	3 50.00	0 0.00	1 16.67
FIXED WINDOWS(3)	3 42.86	1 14.29	1 14.29	2 28.57
ROLL DOWN TYPE 4	0 0.00	2 25.00	1 12.50	5 62.50
TOTAL	5	6	2	8
				21

Table A-39 FATALITIES BY EJCTMED AND MANCOLL
1982 NONSPORT PASSENGER CARS

TABLE OF EJCTMED BY MANCOLL						
EJCTMED	EJECTION MEDIUM	MANCOLL	MANNER	COLLISION		
FREQUENCY ROW PCT						
		NOT COLLISION	HEAD ON	ANGLE		TOTAL
DOOR	(1)	2	1	3		6
		33.33	16.67	50.00		
FIXED WINDOWS	(3)	5	0	2		7
		71.43	0.00	28.57		
ROLL DOWN TYPE	4	6	0	2		8
		75.00	0.00	25.00		
TOTAL		13	1	7		21

Table A-40 FATALITIES BY EJCTMED AND HARMEV1
1982 NONSPORT PASSENGER CARS

17:01 FRIDAY, JULY 18, 1986 1'

TABLE OF HARMEV1 BY EJCTMED

HARMEV1	FIRST HARMFUL EVENT	EJCTMED	EJECTION MEDIUM	
FREQUENCY ROW PCT	DOOR (1)	FIXED WI NDOWS(3)	ROLL DOWN TYPE 4	TOTAL
1	1 33.33	1 33.33	1 33.33	3
12	4 50.00	2 25.00	2 25.00	8
24	0 0.00	0 0.00	2 100.00	2
31	0 0.00	1 100.00	0 0.00	1
32	0 0.00	1 100.00	0 0.00	1
33	1 50.00	0 0.00	1 50.00	2
40	0 0.00	0 0.00	1 100.00	1
42	0 0.00	1 100.00	0 0.00	1
43	0 0.00	1 50.00	1 50.00	2
TOTAL	6	7	8	21

1982 NONSPORT PASSENGER CARS

TABLE OF MEDSTA BY IMPTYPE

MEDSTA	MEDIUM STATUS	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE			
FREQUENCY ROW PCT	FRONT(1)	LEFT E(2)	SID DE(3)	RIGHT SI DE(3)	OTHER IM PACT(5)	TOTAL
OPEN (1)	0	3	0	1		4
	0.00	75.00	0.00	25.00		
SEPARATION (2)	3	1	0	2		6
	50.00	16.67	0.00	33.33		
CLOSED (3)	1	2	2	4		9
	11.11	22.22	22.22	44.44		
RIPPED OPEN (4)	1	0	0	0		1
	100.00	0.00	0.00	0.00		
TOTAL	5	6	2	7		20

Table A-42

FATALITIES BY MEDSTA AND MANCOLL
1982 NONSPORT PASSENGER CARS

17:01 FRIDAY, JULY 18, 1986 20

TABLE OF MEDSTA BY MANCOLL

MEDSTA	MEDIUM STATUS	MANCOLL	MANNER COLLISION	TOTAL
FREQUENCY ROW PCT	NOT COLLISION	HEAD ON	ANGLE	
OPEN (1)	1 25.00	0 0.00	3 75.00	4
SEPARATION (2)	3 50.00	1 16.67	2 33.33	6
CLOSED (3)	7 77.78	0 0.00	2 22.22	9
RIPPED OPEN (4)	1 100.00	0 0.00	0 0.00	1
TOTAL	12	1	7	20

Table A-43 FATALITIES BY MEDSTA AND HARMEV1
1982 NONSPORT PASSENGER CARS

TABLE OF HARMEV1 BY MEDSTA									
HARMEV1	FIRST HARMFUL EVENT	MEDSTA	MEDIUM STATUS						
FREQUENCY ROW PCT	OPEN (1) ON (2)	SEPARATI (3)	CLOSED (4) PEN (4)	RIPPED OI (5)	TOTAL				
1	0	1	2	0	3				
	0.00	33.33	66.67	0.00					
12	3	3	2	0	8				
	37.50	37.50	25.00	0.00					
24	0	0	1	0	1				
	0.00	0.00	100.00	0.00					
31	0	0	1	0	1				
	0.00	0.00	100.00	0.00					
32	0	1	0	0	1				
	0.00	100.00	0.00	0.00					
33	1	0	0	1	2				
	50.00	0.00	0.00	50.00					
40	0	0	1	0	1				
	0.00	0.00	100.00	0.00					
42	0	1	0	0	1				
	0.00	100.00	0.00	0.00					
43	0	0	2	0	2				
	0.00	0.00	100.00	0.00					
TOTAL	4	6	9	1	20				

Table A-44
FATALITIES BY INJSOU1 AND BODYREG1
1982 NONSPORT PASSENGER CARS

TABLE OF INJSOU1 BY BODYREG1

INJSOU1	INJURY SOURCE ONE	BODYREG1	OIC BODY REGION ONE									TOTAL
FREQUENCY ROW PCT	IF	IH	IN	IO	IR	IT	IU	IX				TOTAL
1	0	0	0	0	0	0	0	0	1			1
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00			
5	0	0	0	0	0	0	1	0	0			1
	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00			
11	0	0	0	0	0	1	0	0	0			1
	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00			
63	0	0	4	0	0	0	0	0	0			4
	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00			
84	1	0	0	0	0	0	0	0	0			1
	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
87	0	1	2	0	0	0	0	0	0			3
	0.00	33.33	66.67	0.00	0.00	0.00	0.00	0.00	0.00			
90	0	0	0	0	1	0	0	0	0			1
	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00			
97	0	0	6	3	0	0	0	1	0			10
	0.00	0.00	60.00	30.00	0.00	0.00	0.00	10.00	0.00			
TOTAL	1	1	12	3	1	1	1	1	1			22

Table A-45 ACCIDENT MODE BY EJECTION AND BODYTYPE
1982 NONSPORTS MULTICAR ACCIDENTS
EJECTION=PARTIAL (2)

11:24 SATURDAY, DECEMBER 14, 1985 2

BODYTYPE	FREQUENCY	VEHICLE BODY TYPE CODE CUM FREQ	PERCENT	CUM PERCENT
2-DR SEDAN	2	2	28.571	28.571
3/2 DR HB	4	6	57.143	85.714
4-DR SEDAN	1	7	14.286	100.000

ACCIDENT MODE BY EJECTION AND BODYTYPE
1982 NONSPORTS MULTICAR ACCIDENTS
EJECTION=COMPLETE (1)

11:24 SATURDAY, DECEMBER 14, 1985 25

BODYTYPE	FREQUENCY	VEHICLE BODY TYPE CODE CUM FREQ	PERCENT	CUM PERCENT
2-DR SEDAN	15	15	55.556	55.556
3/2 DR HB	4	19	14.815	70.370
4-DR SEDAN	6	25	22.222	92.593
STATION WAGON	2	27	7.407	100.000

Table A-46 ACCIDENT MODE BY EJECTION AND BODYTYPE
1982 NONSPORTS PASSENGER CAR ACCIDENTS
EJECTION=COMPLETE (1)

11:24 SATURDAY, DECEMBER 14, 1985 27

TABLE OF OBJCONT1 BY BODYTYPE

OBJCONT1	OBJECT CONTACT	BODYTYPE		VEHICLE BODY TYPE CODE		TOTAL	
FREQUENCY ROW PCT	2-DR AN	SED B	3/2 DR H	4-DR AN	5/4 DR EDAN	S WAGON	
31	0.00	100.00	1	0	0.00	0	1
33	83.33	16.67	1	0	0.00	0	6
35	100.00	0.00	0	0	0.00	0	3
37	0.00	0.00	0	1	0	0	1
40	50.00	0.00	0	1	0.00	0	2
43	100.00	0.00	0	0	0.00	0	1
47	50.00	50.00	1	0	0.00	0	2
52	0.00	0.00	0	0	0.00	1	1
54	0.00	100.00	1	0	0.00	0	1
58	100.00	0.00	0	0	0.00	0	1
60	47.50	37.50	15	4	2.50	1	40
63	0.00	66.67	2	0	33.33	0	3
TOTAL	31	21	6	2	2	2	62

Table A-47 ACCIDENT MODE BY EJECTION AND BODYTYPE
 1982 NONSPORTS PASSENGER CAR ACCIDENTS
 EJECTION=PARTIAL (2)

11:24 SATURDAY, DECEMBER 14, 1985 28

TABLE OF OBJCONT1 BY BODYTYPE

OBJCONT1	OBJECT CONTACT	BODYTYPE	VEHICLE BODY TYPE CODE
FREQUENCY ROW PCT	2-DR AN	SED B	3/2 DR HI TOTAL
33	1	1	2
	50.00	50.00	
35	1	0	1
	100.00	0.00	
40	1	1	2
	50.00	50.00	
46	1	0	1
	100.00	0.00	
50	1	0	1
	100.00	0.00	
51	1	0	1
	100.00	0.00	
60	1	4	5
	20.00	80.00	
TOTAL	7	6	13

Table A-48 ACCIDENT MODES BY EJECTION AND BODYTYPE
 1982 NONSPORT PASSENGER CAR ACCIDENTS
 EJECTION=PARTIAL (2)

11:24 SATURDAY, DECEMBER 1985 3.

BODYTYPE	VEHICLE BODY TYPE CODE			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
3/2 DR HB	2	2	100.000	100.000

ACCIDENT MODES BY EJECTION AND BODYTYPE
 1982 NONSPORT PASSENGER CAR ACCIDENTS
 EJECTION=COMPLETE (1)

11:24 SATURDAY, DECEMBER 14, 1985 29

BODYTYPE	VEHICLE BODY TYPE CODE			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
2-DR SEDAN	6	6	42.857	42.857
3/2 DR HB	2	8	14.286	57.143
4-DR SEDAN	6	14	42.857	100.000

Table A-49 AIS INJURY LEVELS BY EJECTAREA AND IMPTYPE
1981 NONSPORT PASSENGER CARS

17:55 WEDNESDAY, JULY 16, 1986

TABLE OF EJECTAREA BY IMPTYPE

EJECTAREA	EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE		
FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SIDE DE(3)	RIGHT SIDE DE(3)	OTHER IM PACT(5)	TOTAL
WINDSHIELD (1)	2 16.67	0 0.00	2 16.67	0 0.00	8 66.67
LEFT FRONT (2)	8 26.67	7 23.33	7 23.33	1 3.33	23.33
RIGHT FRONT (3)	11 42.31	3 11.54	7 26.92	0 0.00	19.23
RIGHT REAR (5)	0 0.00	0 0.00	1 100.00	0 0.00	0.00
REAR (6)	0 0.00	0 0.00	2 50.00	0 0.00	50.00
ROOF (7)	0 0.00	1 25.00	0 0.00	0 0.00	75.00
OTHER AREA (8)	1 100.00	0 0.00	0 0.00	0 0.00	0.00
TOTAL	22	11	19	1	25

Table A-50 AIS INJURY LEVELS BY EJCTAREA AND MANCOLL
1981 NONSPORT PASSENGER CARS

17:55 WEDNESDAY, JULY 16, 1986 2

TABLE OF EJCTAREA BY MANCOLL

EJCTAREA		EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)				MANCOLL		MANNER COLLISION	
FREQUENCY	ROW PCT	NOT COLLISION	REAR END	HEAD ON	ANGLE	SIDE- ME DIR.	SIDE- ME DIR.	TOTAL	
WINDSHIELD (1)		10 83.33	1 8.33	1 8.33	0 0.00	0 0.00	0 0.00	12	
LEFT FRONT (2)		17 56.67	1 3.33	1 3.33	10 33.33	1 3.33	1 3.33	30	
RIGHT FRONT (3)		20 76.92	0 0.00	2 7.69	4 15.38	0 0.00	0 0.00	26	
RIGHT REAR (5)		1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1	
REAR (6)		2 50.00	1 25.00	0 0.00	1 25.00	0 0.00	0 0.00	4	
ROOF (7)		3 75.00	0 0.00	0 0.00	1 25.00	0 0.00	0 0.00	4	
OTHER AREA (8)		1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1	
TOTAL		54	3	4	16	1	1	78	

Table A-51 AIS INJURY LEVELS BY EJCTAREA AND HARMEV1
1981 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJCTAREA

HARMEV1	FIRST HARMFUL EVENT	EJCTAREA	EJECTION AREA (WINDSHIELD, LF, RF, LR, RR)	ROOF	OTHER AREA	TOTAL
FREQUENCY	WINDSHIELD	LEFT FRONT	RIGHT FRONT	REAR	ROOF	OTHER AREA
ROW PCT	LD (1)	NT (2)	ONT (3)	AR (5)	REAR (6)	EA (8)
1	4	2	2	0	1	3
	33.33	16.67	16.67	0.00	8.33	25.00
6	0	1	0	0	0	0
	0.00	100.00	0.00	0.00	0.00	0.00
10	0	0	1	0	0	0
	0.00	0.00	100.00	0.00	0.00	0.00
12	2	13	6	0	2	1
	8.33	54.17	25.00	0.00	8.33	4.17
16	1	0	0	0	0	0
	100.00	0.00	0.00	0.00	0.00	0.00
19	0	4	4	0	1	0
	0.00	44.44	44.44	0.00	11.11	0.00
20	0	0	1	0	0	0
	0.00	0.00	100.00	0.00	0.00	0.00
21	0	1	0	0	0	0
	0.00	100.00	0.00	0.00	0.00	0.00
22	1	1	2	0	0	0
	25.00	25.00	50.00	0.00	0.00	0.00
TOTAL	12	30	26	1	4	4
						78

CONTINUED

Table A-52(Cont..) AIS INJURY LEVELS BY EJCTAREA AND HARMEV1
1981 NONSPORT PASSENGER CARS

17:55 WEDNESDAY, JULY 16, 1986

TABLE OF HARMEV1 BY EJCTAREA

HARMEV1	FIRST HARMFUL EVENT	EJCTAREA	EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)								
FREQUENCY ROW PCT	WINDSHIE LD (1)	LEFT INT (2)	FRONT ONT (3)	FR AR (3)	RIGHT REAR (5)	REAR (6)	ROOF (7)	OTHER AR EA (8)			
23	0 0.00	1 33.33	2 66.67	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3		
24	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1		
25	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1		
26	0 0.00	1 50.00	1 50.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2		
27	0 0.00	1 33.33	0 0.00	1 33.33	0 0.00	0 0.00	0 0.00	1 33.33	3		
28	0 0.00	1 50.00	1 50.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2		
29	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1		
31	3 27.27	4 36.36	4 36.36	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	11		
TOTAL	12	30	26	1	4	4	4	1	78		

Table A-52 AIS INJURY LEVELS BY EJCTMED AND IMPTYPE
1981 NONSPORT PASSENGER CARS

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TABLE OF EJCTMED BY IMPTYPE

EJCTMED	EJECTION MEDIUM	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE					TOTAL
FREQUENCY ROW PCT	FRONT(1)	LEFT SIDE(2)	RIGHT SIDE(3)	REAR(4)	OTHER IMPACT(5)			
DOOR (1)	14 43.75	8 25.00	6 18.75	1 3.13	3 9.38			
OPEN ROOF (2)	0 0.00	1 50.00	0 0.00	0 0.00	1 50.00			
FIXED WINDOWS(3)	2 14.29	0 0.00	3 21.43	0 0.00	9 64.29			
ROLL DOWN TYPE 4	5 21.74	2 8.70	8 34.78	0 0.00	8 34.78			
HINGED TYPE (5)	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00			
OTHER TYPE (7)	0 0.00	0 0.00	0 0.00	0 0.00	2 100.00			
8	1 33.33	0 0.00	1 33.33	0 0.00	1 33.33			
TOTAL	22	11	18	1	25			

Table A-54 (Cont.) AIS INJURY LEVELS BY EJCTMED AND HARMEV1
1981 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY EJCTMED

HARMEV1	FIRST HARMFUL EVENT	EJCTMED	EJECTION MEDIUM								
FREQUENCY ROW PCT	DOOR (1)	OPEN ROO F (2)	FIXED WI NDOWS(3)	ROLL DOWN N TYPE 4	HINGED YPE (5)	OTHER TY PE (7)	8				
23	2 66.67	0 0.00	0 0.00	1 33.33	0 0.00	0 0.00	0 0.00	3			
24	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1			
25	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1			
26	0 0.00	0 0.00	0 0.00	2 100.00	0 0.00	0 0.00	0 0.00	2			
27	1 33.33	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2 66.67	3			
28	2 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	2			
29	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1			
31	6 54.55	0 0.00	3 27.27	2 18.18	0 0.00	0 0.00	0 0.00	11			
TOTAL	32	2	14	23	1	2	3	77			

Table A-55 AIS INJURY LEVELS BY MEDSTA AND IMPTYPE
1981 NONSPORT PASSENGER CARS

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TABLE OF MEDSTA BY IMPTYPE

MEDSTA	MEDIUM STATUS	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE					TOTAL
FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SIDE E(2)	RIGHT SIDE DE(3)	REAR (4) PACT(5)	OTHER IM PACT(5)			
OPEN (1)	4 22.22	5 27.78	5 27.78	1 5.56	3 16.67			
SEPARATION (2)	3 20.00	0 0.00	3 20.00	0 0.00	9 60.00			
CLOSED (3)	15 34.09	6 13.64	10 22.73	0 0.00	13 29.55			
TOTAL	22	11	18	1	25			

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Table A-57 AIS INJURY LEVELS BY MEDSTA AND HARMEV1
1981 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY MEDSTA

HARMEV1	FIRST HARMFUL EVENT	MEDSTA	MEDIUM STATUS	
FREQUENCY ROW PCT	OPEN (1) ON (2)	SEPARATI ON (3)	CLOSED (1) 3)	TOTAL
1	1 8.33	5 41.67	6 50.00	12
6	1 100.00	0 0.00	0 0.00	1
12	6 25.00	3 12.50	15 62.50	24
16	0 0.00	0 0.00	1 100.00	1
19	5 55.56	0 0.00	4 44.44	9
20	0 0.00	0 0.00	1 100.00	1
21	0 0.00	0 0.00	1 100.00	1
22	0 0.00	1 25.00	3 75.00	4
TOTAL	18	15	44	77

Table A-57 (Cont.) AIS INJURY LEVELS BY MEDSTA AND HARMEV1
1981 NONSPORT PASSENGER CARS

17:55 WEDNESDAY, JULY 16, 1986 12

TABLE OF HARMEV1 BY MEDSTA

HARMEV1	FIRST HARMFUL EVENT	MEDSTA	MEDIUM STATUS
FREQUENCY ROW PCT	OPEN (1) ON (2)	SEPARATI ON (2)	CLOSED (3) TOTAL
23	1 33.33	1 33.33	1 33.33
24	0 0.00	0 0.00	1 100.00
25	0 0.00	0 0.00	1 100.00
26	1 50.00	0 0.00	1 50.00
27	1 33.33	0 0.00	2 66.67
28	0 0.00	0 0.00	2 100.00
29	0 0.00	1 100.00	0 0.00
31	2 18.18	4 36.36	5 45.45
TOTAL	18	15	44
			77

TABLE OF INJSOU1 BY BODYREG1

FREQUENCY ROW PCT	A	B	C	E	F	H	I	J	K	L	TOTAL
1	0.00	0.00	0.00	0.00	66.67	33.33	2	0	0.00	0.00	6
2	0.00	0.00	0.00	0.00	100.00	0.00	0	0	0.00	0.00	1
3	0.00	0.00	50.00	1	0	0	0	0	0.00	0.00	2
5	0.00	0.00	0.00	0.00	0.00	100.00	2	0	0.00	0.00	2
11	33.33	0.00	0.00	0.00	0.00	0.00	0	0	0.00	0.00	3
13	0.00	0.00	0.00	0.00	100.00	0.00	0	0	0.00	0.00	2
16	0.00	0.00	0.00	0.00	20.00	80.00	4	0	0.00	0.00	5
25	0.00	0.00	100.00	1	0	0.00	0	0	0.00	0.00	1
31	0.00	0.00	0.00	0.00	100.00	0.00	1	0	0.00	0.00	1
TOTAL	2	3	3	6	1	12	32	2	3		84

CONTINUED)

Table A-58 (Cont.) AIS INJURY LEVELS BY INJSOU1 AND BOSYREG1
1981 NONSPORT PASSENGER CARS

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TABLE OF INJSOU1 BY BODYREG1

INJSOU1	INJURY SOURCE ONE	BODYREG1	OIC BODY REGION ONE																	
FREQUENCY ROW PCT	A	B	C	E	F	H	I	K	L											TOTAL
33	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00										1
34	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	3 100.00	0 0.00	0 0.00										3
41	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00										2
63	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00										1
86	0 0.00	1 9.09	0 0.00	0 0.00	0 0.00	1 9.09	63.64	7 0.00	0 0.00	0 0.00										11
87	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	100.00	1 0.00	0 0.00	0 0.00										1
90	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00										1
97	1 2.44	2 4.88	2 9.76	4 9.76	1 2.44	2 4.88	2 4.88	12 29.27	2 4.88	2 4.88										41
TOTAL	2	3	3	6	1	12	12	32	2	3										84

CONTINUED)

TABLE OF INJSOU1 BY BODYREG1

FREQUENCY ROW PCT	INJ SOURCE ONE	BODYREG1	OIC BODY REGION ONE	TOTAL
1	0	0	0	0
2	0	0	0	0
3	1	0	0	0
5	0	0	0	0
11	33.33	0	0	0
13	0	0	0	0
16	0	0	0	0
25	0	0	0	0
31	0	0	0	0
TOTAL	4	1	2	89

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Table A-58 (Cont.) AIS INJURY LEVELS BY INJSOU1 AND BOSYREG1
1981 NONSPORT PASSENGER CARS

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TABLE OF INJSOU1 BY BODYREG1

INJSOU1	INJURY SOURCE ONE	BODYREG1	OIC BODY REGION ONE	IS	IR	IQ	IP	IO	IT	IU	TOTAL
FREQUENCY ROW PCT	M										
33	0	0	0	0	0	0	0	0	0	0	1
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
34	0	0	0	0	0	0	0	0	0	0	3
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
41	0	0	2	0	0	0	0	0	0	0	2
	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
63	0	0	0	0	0	0	0	0	0	0	1
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
86	0	0	0	1	0	0	0	0	1	0	11
	0.00	0.00	0.00	9.09	0.00	0.00	0.00	0.00	9.09	0.00	
87	0	0	0	0	0	0	0	0	0	0	1
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
90	0	0	0	0	0	0	0	0	1	0	1
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	
97	2	1	0	1	0	1	1	2	3	3	41
	4.88	2.44	0.00	2.44	0.00	2.44	2.44	7.32	9.76	7.32	
TOTAL	4	1	2	2	2	1	1	4	6	3	84

Table A-59

FATALITIES BY EJECTAREA AND IMPTYPE
1981 NONSPORT PASSENGER CARS

17:55 WEDNESDAY, JULY 16, 1986

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TABLE OF EJECTAREA BY IMPTYPE

EJECTAREA	EJECTION AREA (WINDSHIELD,LF,RF,LR,RR)	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE			
FREQUENCY ROW PCT	FRONT(1) E(2)	LEFT SID DE(3)	RIGHT SI DE(3)	REAR (4) PACT(5)	OTHER IM PACT(5)	TOTAL
WINDSHIELD (1)	1 25.00	0 0.00	0 0.00	0 0.00	3 75.00	4
LEFT FRONT (2)	1 25.00	1 25.00	0 0.00	0 0.00	2 50.00	4
RIGHT FRONT (3)	3 33.33	0 0.00	3 33.33	1 11.11	2 22.22	9
LEFT REAR (4)	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	1
RIGHT REAR (5)	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
REAR (6)	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	1
ROOF (7)	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	1
TOTAL	6	1	4	3	7	21

Table A-60 FATALITIES BY EJECTAREA AND MANCOLL
1981 NONSPORT PASSENGER CARS

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TABLE OF EJECTAREA BY MANCOLL

EJECTAREA	FREQUENCY ROW PCT	EJECTION AREA (WINDSHIELD, LF, RF, LR, RR)	MANCOLL	MANNER	COLLISION
		NOT COLLISION	HEAD ON	ANGLE	TOTAL
WINDSHIELD (1)		4	0	0	4
		100.00	0.00	0.00	
LEFT FRONT (2)		4	0	0	4
		100.00	0.00	0.00	
RIGHT FRONT (3)		8	0	1	9
		88.89	0.00	11.11	
LEFT REAR (4)		0	0	1	1
		0.00	0.00	100.00	
RIGHT REAR (5)		0	1	0	1
		0.00	100.00	0.00	
REAR (6)		1	0	0	1
		100.00	0.00	0.00	
ROOF (7)		0	0	1	1
		0.00	0.00	100.00	
TOTAL		17	1	3	21

Table A-62

FATALITIES BY EJECTED AND IMPTYPE
1981 NONSPORT PASSENGER CARS

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TABLE OF EJECTED BY IMPTYPE

EJECTED	EJECTION	MEDIUM	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE				
FREQUENCY ROW PCT	FRONT(1)	LEFT E(2)	SIDE DE(3)	RIGHT SI(4)	REAR PACT(5)	OTHER IM PACT(5)	TOTAL	
DOOR (1)	4 57.14	0 0.00	2 28.57	0 0.00	1 14.29		7	
OPEN ROOF (2)	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00		1	
FIXED WINDOWS(3)	1 25.00	0 0.00	0 0.00	0 0.00	3 75.00		4	
ROLL DOWN TYPE 4	0 0.00	1 16.67	1 16.67	1 16.67	3 50.00		6	
HINGED TYPE (5)	1 33.33	0 0.00	0 0.00	2 66.67	0 0.00		3	
TOTAL	6	1	4	3	7		21	

Table A-63

FATALITIES BY EJECTED AND MANCOLL
1981 NONSPORT PASSENGER CARS

17:55 WEDNESDAY, JULY 16, 1986 20

TABLE OF EJECTED BY MANCOLL

EJCTMED	EJECTION MEDIUM	MANCOLL	MANNER COLLISION	
FREQUENCY ROW PCT	NOT COLLISION	HEAD ON	ANGLE	TOTAL
DOOR (1)	6 85.71	0 0.00	1 14.29	7
OPEN ROOF (2)	0 0.00	0 0.00	1 100.00	1
FIXED WINDOWS (3)	4 100.00	0 0.00	0 0.00	4
ROLL DOWN TYPE 4	6 100.00	0 0.00	0 0.00	6
HINGED TYPE (5)	1 33.33	1 33.33	1 33.33	3
TOTAL	17	1	3	21

Table A-64 FATALITIES BY EJECTMENT AND HARMEV1
1981 NONSPORT PASSENGER CARS

TABLE OF HARMEV1 BY EJECTMENT

HARMEV1	FIRST HARMFUL EVENT	EJECTMED	EJECTION MEDIUM	TOTAL		
FREQUENCY ROW PCT	DOOR (1)	OPEN ROOF (2)	FIXED WINDOWS(3)	WIRING TYPE 4	ROLL OVER HINGED TYPE 5	TOTAL
1	0	0	0	1	0	1
	0.00	0.00	0.00	100.00	0.00	
12	1	1	0	0	2	4
	25.00	25.00	0.00	0.00	50.00	
14	1	0	0	0	0	1
	100.00	0.00	0.00	0.00	0.00	
16	1	0	0	0	0	1
	100.00	0.00	0.00	0.00	0.00	
19	0	0	1	1	1	3
	0.00	0.00	33.33	33.33	33.33	
20	1	0	0	1	0	2
	50.00	0.00	0.00	50.00	0.00	
22	1	0	0	1	0	2
	50.00	0.00	0.00	50.00	0.00	
23	0	0	1	0	0	1
	0.00	0.00	100.00	0.00	0.00	
24	1	0	0	0	0	1
	100.00	0.00	0.00	0.00	0.00	
27	0	0	0	1	0	1
	0.00	0.00	0.00	100.00	0.00	
28	0	0	1	0	0	1
	0.00	0.00	100.00	0.00	0.00	
29	0	0	0	1	0	1
	0.00	0.00	0.00	100.00	0.00	
31	0	0	1	0	0	1
	0.00	0.00	100.00	0.00	0.00	
32	1	0	0	0	0	1
	100.00	0.00	0.00	0.00	0.00	
TOTAL	7	1	4	6	3	21

TABLE OF MEDSTA BY IMPTYPE

MEDSTA	MEDIUM STATUS	IMPTYPE	VEHICLE'S MOST SEVERE IMPACT TYPE						
FREQUENCY ROW PCT	FRONT(1)	LEFT SIDE E(2)	RIGHT SIDE DE(3)	REAR (4)	OTHER IM PACT(5)	TOTAL			
OPEN (1)	0	1	1	0	0	2			
	0.00	50.00	50.00	0.00	0.00				
SEPARATION (2)	2	0	0	2	1	5			
	40.00	0.00	0.00	40.00	20.00				
CLOSED (3)	4	0	3	1	6	14			
	28.57	0.00	21.43	7.14	42.86				
TOTAL	6	1	4	3	7	21			

Table A-66 FATALITIES BY MEDSTA AND MANCOLL
1981 NONSPORT PASSENGER CARS

TABLE OF MEDSTA BY MANCOLL

MEDSTA	MEDIUM STATUS	MANCOLL	MANNER COLLISION	
FREQUENCY ROW PCT	NOT COLLISION	HEAD ON	ANGLE	TOTAL
OPEN (1)	2 100.00	0 0.00	0 0.00	2
SEPARATION (2)	4 80.00	0 0.00	1 20.00	5
CLOSED (3)	11 78.57	1 7.14	2 14.29	14
TOTAL	17	1	3	21

Table A-67

FATALITIES BY MEDSTA AND HARMEV1
1981 NONSPORT PASSENGER CARS

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TABLE OF HARMEV1 BY MEDSTA

HARMEV1 FIRST HARMFUL EVENT MEDSTA MEDIUM STATUS

FREQUENCY ROW PCT	SEPARATI			TOTAL
	OPEN (1)	ON (2)	CLOSED (3)	
1	0	0	1	1
	0.00	0.00	100.00	
12	0	1	3	4
	0.00	25.00	75.00	
14	0	0	1	1
	0.00	0.00	100.00	
16	0	0	1	1
	0.00	0.00	100.00	
19	0	1	2	3
	0.00	33.33	66.67	
20	1	1	0	2
	50.00	50.00	0.00	
22	0	0	2	2
	0.00	0.00	100.00	
23	0	0	1	1
	0.00	0.00	100.00	
24	0	0	1	1
	0.00	0.00	100.00	
27	1	0	0	1
	100.00	0.00	0.00	
28	0	1	0	1
	0.00	100.00	0.00	
29	0	0	1	1
	0.00	0.00	100.00	
31	0	1	0	1
	0.00	100.00	0.00	
32	0	0	1	1
	0.00	0.00	100.00	
TOTAL	2	5	14	21

TABLE OF INJSOU1 BY BODYREG1

INJSOU1	INJURY SOURCE ONE	BODYREG1	OIC BODY REGION ONE	TOTAL			
FREQUENCY ROW PCT	C	IF	IH	IN	IO	IU	I
3	1	0	1	0	0	0	0
	50.00	0.00	50.00	0.00	0.00	0.00	0.00
13	0	0	1	0	0	0	0
	0.00	0.00	100.00	0.00	0.00	0.00	0.00
33	0	1	1	0	0	0	0
	0.00	50.00	50.00	0.00	0.00	0.00	0.00
34	0	0	0	1	0	0	0
	0.00	0.00	0.00	100.00	0.00	0.00	0.00
63	2	0	0	0	0	0	0
	100.00	0.00	0.00	0.00	0.00	0.00	0.00
86	0	0	1	1	0	0	0
	0.00	0.00	50.00	50.00	0.00	0.00	0.00
90	0	0	0	0	1	0	0
	0.00	0.00	0.00	0.00	100.00	0.00	0.00
97	1	0	5	1	0	0	4
	9.09	0.00	45.45	9.09	0.00	36.36	
TOTAL	4	1	9	3	1	4	22

Table A-69

ACCIDENT MODE BY EJECTION AND BODYTYPE
1981 NONSPORTS MULTICAR ACCIDENTS
EJECTION=COMPLETE (1)

11:26 SATURDAY, DECEMBER 14, 1985 ;

BODYTYPE	VEHICLE BODY TYPE CODE		
	FREQUENCY	CUM FREQ	PERCENT
CONVERTIBLE	1	1	5.000
2-DR SEDAN	12	13	60.000
3/2 DR HB	1	14	5.000
4-DR SEDAN	5	19	25.000
5/4 DR SEDAN	1	20	5.000
			100.000

5.000
65.000
70.000
95.000
100.000

A-86

ACCIDENT MODE BY EJECTION AND BODYTYPE
1981 NONSPORTS MULTICAR ACCIDENTS
EJECTION=PARTIAL (2)

11:26 SATURDAY, DECEMBER 14, 1985 2

BODYTYPE	VEHICLE BODY TYPE CODE		
	FREQUENCY	CUM FREQ	PERCENT
2-DR SEDAN	1	1	20.000
3/2 DR HB	2	3	40.000
4-DR SEDAN	1	4	20.000
STATION WAGON	1	5	20.000
			100.000

20.000
60.000
80.000
100.000

1981 NONSPORTS PASSENGER CAR ACCIDENTS
EJECTION=COMPLETE (1)

TABLE OF OBJCONT1 BY BODYTYPE

OBJCONT1	OBJECT CONTACT	BODYTYPE	VEHICLE BODY TYPE CODE	TOTAL		
FREQUENCY ROW PCT	CONVERTIBLE	2-DR SEDAN	3/2 DR HAN	4-DR SEDAN	STATION WAGON	
31	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
32	0 0.00	1 20.00	2 40.00	2 40.00	0 0.00	5
33	0 0.00	4 66.67	0 0.00	2 33.33	0 0.00	6
34	0 0.00	6 66.67	0 0.00	3 33.33	0 0.00	9
37	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	1
39	0 0.00	3 100.00	0 0.00	0 0.00	0 0.00	3
40	0 0.00	1 50.00	1 50.00	0 0.00	0 0.00	2
41	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
43	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
44	0 0.00	0 0.00	0 0.00	0 0.00	1 100.00	1
46	0 0.00	15 51.72	6 20.69	6 20.69	2 6.90	29
50	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
TOTAL	1	33	9	14	3	60

Table A-71 ACCIDENT MODE BY OBJCONT1 AND BODYTYPE
1981 NONSPORTS PASSENGER CAR ACCIDENTS
EJECTION=PARTIAL (2)

OBJCONT1	OBJECT CONTACT	BODYTYPE	VEHICLE BODY TYPE CODE	TOTAL				
FREQUENCY ROW PCT	2-DR AN	SED B	3/2 DR H	4-DR I	SED J	STATION K	WAGON L	TOTAL
32	0 0.00	0 0.00	0 0.00	1 100.00	0 0.00	0 0.00	0 0.00	1
33	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
34	1 33.33	1 33.33	1 33.33	1 33.33	0 0.00	0 0.00	0 0.00	3
37	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
38	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
39	0 0.00	1 50.00	1 50.00	1 50.00	0 0.00	0 0.00	0 0.00	2
40	0 0.00	0 0.00	0 0.00	1 50.00	1 50.00	1 50.00	0 0.00	2
44	0 0.00	1 100.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
46	1 14.29	3 42.86	2 28.57	2 28.57	1 14.29	1 14.29	0 0.00	7
48	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	0 0.00	1
50	0 0.00	1 100.00	1 100.00	0 0.00	0 0.00	0 0.00	0 0.00	1
TOTAL	6	7	7	6	2	2	2	21

Table A-72 ACCIDENT MODES BY EJECTION AND BODYTYPE
 1981 NONSPORT PASSENGER CAR ACCIDENTS
 EJECTION=COMPLETE (1) 11:26 SATURDAY, DECEMBER 14, 1985 3:

BODYTYPE	VEHICLE BODY TYPE CODE			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
CONVERTIBLE	1	1	7.692	7.692
2-DR SEDAN	5	6	38.462	46.154
3/2 DR HB	1	7	7.692	53.846
4-DR SEDAN	4	11	30.769	84.615
5/4 DR SEDAN	1	12	7.692	92.308
STATION WAGON	1	13	7.692	100.000

ACCIDENT MODES BY EJECTION AND BODYTYPE
 1981 NONSPORT PASSENGER CAR ACCIDENTS
 EJECTION=PARTIAL (2) 11:26 SATURDAY, DECEMBER 14, 1985 32

BODYTYPE	VEHICLE BODY TYPE CODE			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
2-DR SEDAN	1	1	100.000	100.000

Table A-73 DISTRIBUTION OF BODYREGION
1983 LIGHT TRUCKS
VANS

17:14 MONDAY, OCTOBER 21, 1985

6

BODYREG1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
HEAD/FACE	5	5	35.714	35.714
CHEST/BACK	1	6	7.143	42.857
ABDOMEN/PELVIS	1	7	7.143	50.000
OTHER	7	14	50.000	100.000

DISTRIBUTION OF INJURY SOURCE
1983 LIGHT TRUCKS
VANS

17:14 MONDAY, OCTOBER 21, 1985

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INJSOU1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
STEERING ASSEMBLY	1	1	7.143	7.143
WINDSHIELD	1	2	7.143	14.286
FRONT INTERIORS	1	3	7.143	21.429
A-PILLAR	1	4	7.143	28.571
SIDE GLASS/FRAME	1	5	7.143	35.714
SIDE RAIL	1	6	7.143	42.857
EXTERIOR	3	9	21.429	64.286
NON-CONTACT	1	10	7.143	71.429
UNKNOWN	4	14	28.571	100.000

17:15 MONDAY, OCTOBER 21, 1985 2

Table A-74 DISTRIBUTION OF BODYREGION
1983 LIGHT TRUCKS
PICKUPS

BODYREG1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
HEAD/FACE	36	36	43.902	43.902
NECK	6	42	7.317	51.220
CHEST/BACK	8	50	9.756	60.976
ABDOMEN/PELVIS	4	54	4.878	65.854
OTHER	28	82	34.146	100.000

17:15 MONDAY, OCTOBER 21, 1985 9

DISTRIBUTION OF INJURY SOURCE
1983 LIGHT TRUCKS
PICKUPS

INJSOU1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
FRONT INTERIORS	1	1	1.220	1.220
FLOOR COMPONENTS	1	2	1.220	2.439
SIDE INTERIORS	1	3	1.220	3.659
SIDE GLASS/FRAME	2	5	2.439	6.098
SIDE RAIL	1	6	1.220	7.317
ROOF INTERIORS	1	7	1.220	8.537
EXTERIOR	30	37	36.585	45.122
NON-CONTACT	2	39	2.439	47.561
UNKNOWN	43	82	52.439	100.000

17:16 MONDAY, OCTOBER 21, 1985 2

Table A-75

DISTRIBUTION OF BODYREGION
1983 LIGHT TRUCKS
OTHER LIGHT TRUCKS

BODYREG1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
HEAD/FACE	13	13	37.143	37.143
NECK	3	16	8.571	45.714
CHEST/BACK	5	21	14.286	60.000
ABDOMEN/PELVIS	1	22	2.857	62.857
OTHER	13	35	37.143	100.000

17:16 MONDAY, OCTOBER 21, 1985 9

DISTRIBUTION OF INJURY SOURCE
1983 LIGHT TRUCKS
OTHER LIGHT TRUCKS

INJSOU1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
STEERING ASSEMBLY	2	2	5.714	5.714
A-PILLAR	1	3	2.857	8.571
SIDE GLASS/FRAME	2	5	5.714	14.286
EXTERIOR	7	12	20.000	34.286
UNKNOWN	23	35	65.714	100.000

Table A-76

DISTRIBUTION OF BODYREGION
1982 LIGHT TRUCKS
VANS

17:12 MONDAY, OCTOBER 21, 1985

E

BODYREG1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
HEAD/FACE	2	2	16.667	16.667
CHEST/BACK	3	5	25.000	41.667
ABDOMEN/PELVIS	1	6	8.333	50.000
OTHER	6	12	50.000	100.000

17:12 MONDAY, OCTOBER 21, 1985

6

DISTRIBUTION OF INJURY SOURCE
1982 LIGHT TRUCKS
VANS

INJSOU1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
SIDE INTERIORS	1	1	8.333	8.333
RESTRANTS	1	2	8.333	16.667
EXTERIOR	6	8	50.000	66.667
UNKNOWN	4	12	33.333	100.000

Table A-77

DISTRIBUTION OF BODYREGION
1982 LIGHT TRUCKS
PICKUPS

14:57 MONDAY, OCTOBER 21, 1985

7

BODYREG1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
HEAD/FACE	26	26	55.319	55.319
NECK	4	30	8.511	63.830
CHEST/BACK	2	32	4.255	68.085
ABDOMEN/PELVIS	4	36	8.511	76.596
OTHER	11	47	23.404	100.000

DISTRIBUTION OF INJURY SOURCE
1982 LIGHT TRUCKS
PICKUPS

14:57 MONDAY, OCTOBER 21, 1985

8

INJSOU1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
STEERING ASSEMBLY	3	3	6.383	6.383
WINDSHIELD	2	5	4.255	10.638
FRONT INTERIORS	1	6	2.128	12.766
FR. ROOF HEADER	3	9	6.383	19.149
A-PILLAR	1	10	2.128	21.277
SIDE GLASS/FRAME	1	11	2.128	23.404
REAR INTERIORS	1	12	2.128	25.532
EXTERIOR	11	23	23.404	48.936
NON-CONTACT	1	24	2.128	51.064
UNKNOWN	23	47	48.936	100.000

Table A-78

DISTRIBUTION OF BODYREGION
1982 LIGHT TRUCKS
OTHER LIGHT TRUCKS

BODYREG1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
HEAD/FACE	9	9	37.500	37.500
CHEST/BACK	2	11	8.333	45.833
ABDOMEN/PELVIS	3	14	12.500	58.333
OTHER	10	24	41.667	100.000

DISTRIBUTION OF INJURY SOURCE
1982 LIGHT TRUCKS
OTHER LIGHT TRUCKS

INJSOU1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
FRONT INTERIORS	1	1	4.167	4.167
FR. ROOF HEADER	1	2	4.167	8.333
SIDE INTERIORS	2	4	8.333	16.667
A-PILLAR	1	5	4.167	20.833
SEAT BACK	1	6	4.167	25.000
EXTERIOR	5	11	20.833	45.833
UNKNOWN	13	24	54.167	100.000

17:13 MONDAY, OCTOBER 21, 1985 2

Table A-79

DISTRIBUTION OF BODYREGION
1981 LIGHT TRUCKS
VANS

BODYREG1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
HEAD/FACE	2	2	33.333	33.333
NECK	1	3	16.667	50.000
CHEST/BACK	1	4	16.667	66.667
ABDOMEN/PELVIS	2	6	33.333	100.000

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DISTRIBUTION OF INJURY SOURCE
1981 LIGHT TRUCKS
VANS

INJSOU1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
FRONT INTERIORS	1	1	16.667	16.667
EXTERIOR	1	2	16.667	33.333
UNKNOWN	4	6	66.667	100.000

Table A-80

DISTRIBUTION OF BODYREGION
1981 LIGHT TRUCKS
PICKUPS

14:59 MONDAY, OCTOBER 21, 1985

BODYREG1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
HEAD/FACE	4	4	17.391	17.391
NECK	4	8	17.391	34.783
CHEST/BACK	4	12	17.391	52.174
ABDOMEN/PELVIS	2	14	8.696	60.870
OTHER	9	23	39.130	100.000

DISTRIBUTION OF INJURY SOURCE
1981 LIGHT TRUCKS
PICKUPS

14:59 MONDAY, OCTOBER 21, 1985

INJSOU1	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
WINDSHIELD	1	1	4.348	4.348
FR. ROOF HEADER	1	2	4.348	8.696
FLOOR COMPONENTS	1	3	4.348	13.043
SIDE INTERIORS	1	4	4.348	17.391
REAR INTERIORS	1	5	4.348	21.739
EXTERIOR	5	10	21.739	43.478
NON-CONTACT	1	11	4.348	47.826
UNKNOWN	12	23	52.174	100.000

Table A-81

17:18 MONDAY, OCTOBER 21, 1985

3

BODYREG1	DISTRIBUTION OF BODYREGION 1981 LIGHT TRUCKS OTHER LIGHT TRUCKS			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
HEAD/FACE ABDOMEN/PELVIS	2	2	66.667	66.667
	1	3	33.333	100.000

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INJSOU1	DISTRIBUTION OF INJURY SOURCE 1981 LIGHT TRUCKS OTHER LIGHT TRUCKS			
	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
EXTERIOR UNKNOWN	2	2	66.667	66.667
	1	3	33.333	100.000

APPENDIX B

1984-1980 Hard Copy NASS Case Analysis

ACCIDENT : 1984 NASS
CASE : 58 047T
VEHICLE : 1972 Ford Gran Torino, 2-dr. sedan
CRASH MODE : Side at an angle with ditch
ROLLOVER : No
OCCUPANT : Male, 16, driver
EJECT. PATH : Right door
MAIS : AIS-1 Head abrasion
INJ. SOURCE : Unknown
CASE FACTS : Vehicle was travelling on 2-lane rural roadway. It swerved to the left off the road, rotated 90 degrees counterclockwise, hit a ditch pipe with the right side, hit a tree, a sign, and then stopped. Damage to both ends, right side, hood.
DOOR LATCH/HINGE: Unable to tell. The right front door was severely impacted (almost broken in two) at the B pillar, which caused the door to open. Doubt that even an improved latch system could have withstood impact.

ACCIDENT : 1984 NASS
CASE : 10 132W
VEHICLE : 1973 Ford Pinto, 2-dr. sedan
CRASH MODE : Left rear impacted a tree
ROLLOVER : Yes, less than 4 quarter-turns
OCCUPANT : Male, 18, driver
EJECT. PATH : Left door
MAIS : AIS-1 Shoulder/back
INJ. SOURCE : Side interior
CASE FACTS : The case vehicle lost control when travelling on a two-lane road. The vehicle skidded sideways into median and struck a big tree at the left rear axial area, and then turned over. This resulted in severe damage on the left rear quarter panel/roof/door area.

DOOR LATCH/HINGE: The striker slipped longitudinally out of the right door lock during accident. Both striker and lock are retained on B pillar and door panel.

REMARKS: The right door is buckled out due to occupant's contact. Also, B pillar and striker (position) were twisted outward as the door buckled out. The report shows that the car has many places rusted out. The strength of vehicle components such as B post/doors were considerably weakened in comparison with the original components.

ACCIDENT : 1984 NASS
CASE : 13 120T
VEHICLE : 1974 AMC Hornet Station wagon
CRASH MODE : Left front impact at 90 degrees
ROLLOVER : No
OCCUPANT : Female, 38, driver
Male, 18, second seat-right passenger
EJECT. PATH : Right front door
Right front door
MAIS : AIS-3 Back
AIS-3 Thigh
INJ. SOURCE : Unknown
Unknown
CASE FACTS : The case vehicle lost control when the driver tried to stop at the intersection of a railroad on a four-lane divided highway. The vehicle skipped and impacted the guardrail and railway flasher, then the train struck on the left front of the vehicle. This caused extensive damage on the left front/door structures. Right front door opened during the impact.
DOOR LATCH/HINGE: Right front door latch failure.
REMARKS: No details are available regarding the door failure causes. The report shows that the door is jammed open but hinges were still attached to the A pillar.

ACCIDENT : 1984 NASS
CASE : 81 145W
VEHICLE : 1965 Ford Mustang, 2-dr. hardtop
CRASH MODE : Non-collision
ROLLOVER : Yes, less than 4 quarter-turns
OCCUPANT : Male, 15, driver
EJECT. PATH : Left door
MAIS : AIS-1 Face
INJ. SOURCE : Unknown
CASE FACTS : The case vehicle lost control when travelling on a two-lane rural road, and rolled into side ditch.
DOOR LATCH/HINGE: Suspected that the latch popped open because both doors in the picture were properly lined up and closed.
REMARKS: This is an old car with previous body repair work on both doors.

ACCIDENT : 1984 NASS
CASE : 30 154L
VEHICLE : 1979 Dodge Diplomat
CRASH MODE : Front to front, 90 degree impact
ROLLOVER : No
OCCUPANT : Female, 55, driver
EJECT. PATH : Left front door
MAIS : AIS-1 Neck
INJ. SOURCE : Non-contact
CASE FACTS : The case vehicle collided with an on-coming 1978 GMC Astra truck-tractor when came out of a private driveway. Then the vehicle went out of control and collided with a tree. This resulted in structure damage on both front and rear bumper and the associated areas.
DOOR LATCH/HINGE: It is reported that the left front door popped open when the vehicle impacted the tree. However, the door latch system was not damaged.

ACCIDENT : 1984 NASS

CASE : 52 047J

VEHICLE : 1965 Chrysler New Yorker, 4-dr. sedan

CRASH MODE : Front right/rear left impacts

ROLLOVER : No

OCCUPANT : Male, 83, driver

EJECT. PATH : Left front door

MAIS : AIS-6 Head

INJ. SOURCE : Exterior of striking vehicle

CASE FACTS : The case vehicle travelled on a four-lane divided highway.

The vehicle's right side was struck by a 1980 Freightliner when the vehicle tried to shift from left lane to right lane. Then the vehicle went out of control and skidded across the median and collided with an oncoming vehicle, a 1981 Dodge van. This caused the front structure to be torn off, severe damage on left rear and side structure.

DOOR LATCH/HINGE: Both front doors were open with intact hinges attaching the doors to A pillars. Suspect that latch popped open during accident because the strikers were still on B pillars (deformed).

REMARKS: The whole vehicle's structures were severely damaged. Left side A pillar was torn away from the roof.

ACCIDENT : 1984 NASS
CASE : 10 129S
VEHICLE : 1982 Honda Civic, Station Wagon
CRASH MODE : Front left side impact with a utility pole
ROLLOVER : Yes, details unknown
OCCUPANT : Female, 22, driver
EJECT. PATH : Left front door
MAIS : AIS-6 Fatal
INJ. SOURCE : Unknown
CASE FACTS : The case vehicle lost control when travelled at a high speed on a curved, two-lane road. The vehicle ran off the road and struck a utility pole at the left front side of the vehicle. Subsequently, the vehicle turned over and rolled. This resulted in severe damage on the vehicle left side structure and roof, and vehicle was torn at the B pillar position.
DOOR LATCH/HINGE: Unable to tell.
REMARKS: The left side structure was torn apart with doors and A/B pillars ripped off.

ACCIDENT : 1984 NASS

CASE : 28 055T

VEHICLE : 1982 Honda Civic

MODE : Front off-set collision with a signal pole

ROLLOVER : No

OCCUPANT : Female, 25, driver

EJECT. PATH : Left front door

MAIS : AIS-7 Unknown severity, chest injury

INJ. SOURCE : Steering assembly

CASE FACTS : The case vehicle collided with a 1976 Buick Electra travelling on the main road when the case vehicle merged from a side road to the main road. The case vehicle lost control and ran off the road, and then struck a signal pole on the left front end. This resulted in severe damage on the front, left and rear left structures. The front bumper was also torn off.

DOOR LATCH/HINGE: Latch mechanism failure, but the striker remained intact.

REMARKS: The left front door was buckled outward due to occupant impact. The B post deformed at striker anchorage area.

ACCIDENT : 1984 NASS

CASE : 12 041T

VEHICLE : 1978 Fiat 128 Custom, 2-dr sedan

CRASH MODE : Non collision

ROLLOVER : Yes, 4 or more quarter-turns

OCCUPANT : Male, 18, front seat passenger

EJECT. PATH : Right door

MAIS : AIS-1 Head/Face

INJ. SOURCE : Unknown

CASE FACTS : The case vehicle went out of control when travelling on a straight, two-lane road. The vehicle skidded off the road and resulted in a rollover incident. This cause severe roof crushing at right front, and severe damage on front right structure.

DOOR LATCH/HINGE: Suspected that the lock mechanism failed during the accident.

REMARKS: The report shows that the right front door is closed/jammed during accident inspection. This implies that the hinges were not really damaged but the lock may have been damaged to a certain degree. Slides show that the right front door is properly aligned in spite of roof crushing.

ACCIDENT : 1984 NASS

CASE : 28 105T

VEHICLE : 1982 Olds 98, 2-dr. sedan

CRASH MODE : Front right impact with a pole.

ROLLOVER : No

OCCUPANT : Male, 19, driver
Male, 19, front seat passenger

EJECT. PATH : Right front door

MAIS : AIS-4 Head
AIS-2 Knee

INJ. SOURCE : Front header
Instrument panel

CASE FACTS : The case vehicle lost control when travelling on a two lane urban road. The vehicle ran off the road and struck a utility pole. This caused severe damage on the right front structure and roof buckled at the B pillar position.

DOOR LATCH/HINGE: Suspected door latch mechanism failure. Unable to tell what exactly happened.

REMARKS: The report indicates that the right front door is jammed open, and hinges are retained on the A post.

ACCIDENT : 1984 NASS
CASE : 30 139V
VEHICLE : 1979 Plymouth Horizon, 3-dr. hatchback
CRASH MODE : Frontal impact with embankment
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Female, 24, driver
EJECT. PATH : Left front door
MAIS : AIS- Whole body (hospitalization)
INJ. SOURCE : Unknown
CASE FACTS : The case vehicle lost control when the right side tires ran off the road and got into the median. The vehicle ran across the two-lane road and struck the embankment, and subsequently the vehicle turned over and rolled. This caused severe damage on the front and left side of the vehicle.
DOOR LATCH/HINGE: Door latch mechanism failure. Suspected that lock popped open during accident.
REMARKS: The slides show that the left front door is jammed open and door hinges are attached to A post. There was no detail to tell how latch mechanism failed during the crash.

ACCIDENT : 1984 NASS
CASE : 30 130S
VEHICLE : 1979 Olds Delta 88, 2-dr. sedan
CRASH MODE : Right front impact to a stone wall.
ROLLOVER : No
OCCUPANT : Male, 83, driver
EJECT. PATH : Left front door
MAIS : AIS-7 Fatal, injury severity unknown, body region unknown
INJ. SOURCE : Unknown
CASE FACTS : The case vehicle went into a lookout point on a two-lane road. The vehicle failed to stop and collided head on with a 2' stone wall. This resulted in total damage of the right front structure and structure buckled in at B post area.
DOOR LATCH/HINGE: Unable to tell, suspect that the left front door latch popped open due to front structure crush and side structure buckling.
REMARKS: The left front door was jammed open. The driver was ejected partially from the door opening.

ACCIDENT : 1984 NASS
CASE : 30 179K
VEHICLE : 1971 Dodge Dart, 2-dr. sedan
CRASH MODE : Side-swipe
ROLLOVER : Yes, less than 4 quarter-turns
OCCUPANT : Female, 76, driver
EJECT. PATH : Left front door
MAIS : AIS-4 Chest
INJ. SOURCE : Steering assembly
CASE FACTS : The case vehicle lost control when dropping from road to road
shoulder on a four-lane, divided highway. The vehicle ran
into the left lane and collided side-by-side with a single
unit straight truck. Both vehicles ran over center median
and across to the opposite lanes and then overturned into
trees.
DOOR LATCH/HINGE: Unable to tell, suspect latch failure.
REMARKS: The slides show that the case vehicle is severely
damaged on the front, front left roof and left door; the
door is severely buckled at the middle, and the lock is
disengaged from striker, but no details are available on
damage, to door latch mechanism.

ACCIDENT : 1984 NASS

CASE : 32 161L

VEHICLE : 1983 Dodge Aries, 4-dr. sedan

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Female, 17, driver

EJECT. PATH : Left front door

MAIS : AIS-1 Face laceration

INJ. SOURCE : Ground

CASE FACTS : Making a left turn at an intersection, the vehicle was hit on left side by a car coming from the left. It rotated 270 degrees counterclockwise and then hit a parked car with the front right corner. Damage to left side, front end.

DOOR LATCH/HINGE: Suspect latch failure. Slides show the left front door is dented at the B pillar but in line and closed; pillars intact.

ACCIDENT : 1984 NASS

CASE : 31 154V

VEHICLE : 1975 Oldsmobile 98, 2-dr. sedan

CRASH MODE : Front

ROLLOVER : No

OCCUPANT : Male, 34, passenger

EJECT. PATH : Right front door

MAIS : AIS-1 Ear laceration

INJ. SOURCE : Unknown

CASE FACTS : Rounding a left hand curve on a 4-lane highway, vehicle swerved to the left and hit an oncoming car with the right front end. It rotated 180 degrees counterclockwise and stopped. Damage to right front end, hood.

DOOR LATCH/HINGE: Suspect latch failure. Slides show right door open, but intact, in line and still attached; pillars intact. Damage occurred only to the front end and front right panel.

ACCIDENT : 1984 NASS
CASE : 30 231T
VEHICLE : 1968 Ford Galaxie 500, 2-dr. sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Male, 18, passenger
EJECT. PATH : Right front door
MAIS : AIS-2 Back fracture
INJ. SOURCE : Side interior surface
CASE FACTS : Travelling on a narrow road, vehicle swerved off to the
right, rotated 90 degrees counterclockwise, hit a tree with
the right rear side, travelled further, then hit another tree
with the right side. Damage to trunk, right rear side, left
front side.
DOOR LATCH/HINGE: Report states that the door flew open when car struck the
tree. Slides show right door in line but bent slightly in
the B pillar area. Door itself and pillars intact. Suspect
latch failure.

ACCIDENT : 1984 NASS
CASE : 54 024T
VEHICLE : 1971 Datsun 240Z, 3-dr./2-dr. hatchback
CRASH MODE : Left side
ROLLOVER : No
OCCUPANT : Male, 23, driver
EJECT. PATH : Left front door
MAIS : AIS-1 Arm laceration
INJ. SOURCE : Impact force
CASE FACTS : Crossing an intersection, vehicle was hit on left side by a car making a left turn at the same time. It rotated 90 degrees counterclockwise, skidded sideways, hit a sign post, then an iron pipe with the right side and stopped. Damage to left side, dents to right door.
DOOR LATCH/HINGE: Suspect latch failure. Slides show the left door and rear panel deeply dented, but in line and closed; pillars intact. Overall damage was restricted to sheet metal only.

ACCIDENT : 1984 NASS
CASE : 54 102J
VEHICLE : 1971 Ford Torino GT, 2-Dr. Sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Male, 62, driver
EJECT. PATH : Left front door
MAIS : AIS-6 Chest crush
INJ. SOURCE : Side interior surface
CASE FACTS : Driving on a 3-lane road, vehicle was hit on the left side by a truck which was turning right from the middle lane. It went forward, rotated 90 degrees counterclockwise, went into the oncoming lane, then was hit on the right side by an oncoming bus. Damage to all parts of car.
DOOR LATCH/HINGE: Suspect latch failure. Slides show the open left door is dented with latch mechanism torn off, but attached at both hinges and in line. Internally, the door is bent outward due to occupant impact. Most of the damage to the vehicle occurred during the right side impact. Left pillars are tilted sideways but intact.

ACCIDENT : 1984 NASS
CASE : 33 087S
VEHICLE : 1978 Ford Fiesta, 3-dr./2-dr. hatchback
CRASH MODE : Other location (top)
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Male, 55, driver
EJECT. PATH : Left front door
MAIS : AIS-4 Lung contusion
INJ. SOURCE : Unknown
CASE FACTS : Returning to the right lane after passing another car on a 2-lane highway, vehicle hit the car with the right rear side, rotated 90 degrees clockwise, hit the guardrail with the left front corner, rotated 90 degrees clockwise again, rolled over, and hit a parked car with the top. Damage to top, left and right sides.
DOOR LATCH/HINGE: Suspect latch failure. The left door was open and bent, but attached at both hinges. The left front panel shows dent only. Pillars intact. Suspect the door flew open after one of the vehicle's impacts.

ACCIDENT : 1984 NASS
CASE : 76 143T
VEHICLE : 1964 Volkswagen Bug, 2-dr. sedan
CRASH MODE : Front end
ROLLOVER : No
OCCUPANT : Male, 19, driver
EJECT. PATH : Right front door
MAIS : AIS-2 Wrist fracture
INJ. SOURCE : Steering assembly
CASE FACTS : Crossing an intersection, vehicle hit the right side of
another vehicle coming from the left. Damage to front end,
front panels.
DOOR LATCH/HINGE: Suspect the latch failed. Doors are intact and in line.
Damage occurred only to front end of vehicle.

ACCIDENT : 1984 NASS
CASE : 81 074S
VEHICLE : 1978 Toyota Corona, 2-dr. sedan
CRASH MODE : Undercarriage
ROLLOVER : Yes, details unknown
OCCUPANT : Male, 23, driver
EJECT. PATH : Left front door
MAIS : AIS-3 Brain, unknown lesion
INJ. SOURCE : Unknown
CASE FACTS : Vehicle swerved to the right off of the road, hit a pile of dirt and debris, rotated 90 degrees clockwise and turned over. Damage to all parts of car.
DOOR LATCH/HINGE: Suspect latch failure. The left door is in line, intact and closed. The roof, window frame and pillars were pushed to the left during overturn; suspect the leftward force damaged the latch and caused the door to open.

ACCIDENT : 1984 NASS

CASE : 30 216T

VEHICLE : 1982 Ford Escort, 3-dr./2-dr. hatchback

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 24, driver

EJECT. PATH : Left front door

MAIS : AIS-5 Brain concussion

INJ. SOURCE : Unknown

CASE FACTS : Crossing an intersection, vehicle was hit by an oncoming car from the left. It went forward, rotated 90 degrees clockwise and stopped. Damage to left front panel, left side.

DOOR LATCH/HINGE: Suspect latch failure. Slides show the outer panel of the left door separated, but the rest of the door is in line and attached at both hinges. Front panel buckled inward. A and B pillars bent. Suspect the impact to the left side caused the door to open.

ACCIDENT : 1984 NASS
CASE : 59 149S
VEHICLE : 1982 Honda Accord, 4-dr. sedan
CRASH MODE : Undercarriage
ROLLOVER : Yes less than 4 quarter-turns
OCCUPANT : Male, 51, driver
EJECT. PATH : Left front door
MAIS : AIS-7 Unknown
INJ. SOURCE : Unknown
CASE FACTS : Vehicle swerved off the road to the right, hit a pile of debris with the undercarriage and turned over. Damage to front end, sides, top.
DOOR LATCH/HINGE: Suspect latch failure. Slides show part of the left front door is crushed, but the door is in line and attached. The A pillar and top of the door were pushed downward, which may have forced the door to open. The B pillar is intact.

ACCIDENT : 1984 NASS

CASE : 34 168T

VEHICLE : 1981 Datsun 210, station wagon

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Female, 29, passenger

EJECT. PATH : Right front door

MAIS : AIS-7 Neck, unknown lesion

INJ. SOURCE : Unknown

CASE FACTS : Making a left turn at an intersection, vehicle was hit on the right rear side by an oncoming car. It rotated 180 degrees clockwise and stopped. Damage to right rear side, rear end.

DOOR LATCH/HINGE: Suspect latch failure. Slides show right front door is in line and closed. Damage occurred only to right rear panel and rear end of car.

ACCIDENT : 1984 NASS
CASE : 58 119T
VEHICLE : 1978 Mercury Zephyr, station wagon
CRASH MODE : Front
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Male, 17, driver
EJECT. PATH : Right front door
MAIS : AIS-2 Brain concussion
INJ. SOURCE : Ground
CASE FACTS : Rounding a left-hand curve on a 2-lane road, vehicle hit the curb with the right front corner. It skidded along the curb some distance and overturned. Damage to top, both sides, both ends, hood.

DOOR LATCH/HINGE: Suspect latch/hinge failure. Slides show right front door was open, but loosened at the top hinge and out of line. The front panel was separated during the side impact, which may have pulled the door out of line, and loosened the top hinge. Pillars intact. Roof was dented slightly in the area above the B pillar. The right front door is bent outward at the middle, possibly due to occupant impact. Suspect the door sprang open due to latch failure, and was damaged during impact and rollover.

ACCIDENT : 1984 NASS

CASE : 04 063T

VEHICLE : 1964 Buick LeSabre, 4-dr. sedan

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Male, 23, driver

EJECT. PATH : Right front door

MAIS : AIS-1 Face laceration

INJ. SOURCE : Windshield

CASE FACTS : Travelling on a 2-lane road, the vehicle swerved off to the right, hit a utility pole with the right side, rotated 45 degrees clockwise and stopped. Damage to the right side, top, hood, trunk.

DOOR LATCH/HINGE: Both right doors were completely detached; the right front door did not appear in the slides. Pillars are intact, though right B pillar is bent somewhat in the middle. Front and rear panels dented slightly. Suspect hinge failure; however, the condition of the doors is not clear since they are not clearly shown in the slides.

ACCIDENT : 1984 NASS
CASE : 08 131T
VEHICLE : 1969 Toyota Corona 1900, 2-dr. sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Male, 22, driver
Male, 17, passenger
EJECT. PATH : Right front door
Right front door
MAIS : AIS-2 Brain concussion
AIS-1 Brain concussion
INJ. SOURCE : Unknown
Unknown
CASE FACTS : Making a left turn, vehicle was hit on right side by an
oncoming vehicle. It rotated 90 degrees counterclockwise,
went on to curb and stopped. Damage to right middle side.
DOOR LATCH/HINGE: Suspect hinge failure. The right door is missing, broken
off at the hinges. The right rear panel is buckled inward
somewhat. Pillars intact. Suspect the impact to the door
and panel broke the latch and weakened or broke the hinges.

ACCIDENT : 1984 NASS
CASE : 53 117S
VEHICLE : 1973 Mercury Marquis, 4-dr. sedan
CRASH MODE : Right side
ROLLOVER : Yes, less than 4 quarter-turns
OCCUPANT : Female, 49, passenger
Male, 35, passenger
EJECT. PATH : Right front door
Right front door
MAIS : AIS-6 Chest crush
AIS-1 Head laceration
INJ. SOURCE : Unknown
Unknown
CASE FACTS : Crossing a railroad intersection, vehicle was hit on right side by an oncoming train. It rotated 270 degrees counterclockwise, turned over and stopped. Damage to right side, front end, top.
DOOR LATCH/HINGE: Suspect latch failure. Slides show right front door is bent outward in the middle and crush of sheet metal around the hinges, but is in line and attached; right A pillar intact but tilted sideways somewhat. Suspect the door was bent outward by occupant impact and flew open.

ACCIDENT : 1984 NASS
CASE : 11 057J
VEHICLE : 1980 Buick Regal 3.8 Litre, 2-dr. sedan
CRASH MODE : Front
ROLLOVER : No
OCCUPANT : Female, 65, driver
EJECT. PATH : Left front door
MAIS : AIS-6 Head crush
INJ. SOURCE : Instrument panel & below
CASE FACTS : Travelling on a 2-lane highway, the vehicle swerved to the left, and was hit on right front corner by an oncoming truck. It skidded sideways to left and stopped. Damage to all parts of vehicle.
DOOR LATCH/HINGE: Suspect latch failure. Slides show the left door is open, out of line, but attached at the hinges; left A pillar is intact but tilted sideways. Left front panel is crushed and partly separated. Suspect the door flew open during impact to the right front side.

ACCIDENT : 1984 NASS
CASE : 36 150T
VEHICLE : 1976 Oldsmobile Delta 88 Royale, 2-dr. sedan
CRASH MODE : Non-collision
ROLLOVER : No
OCCUPANT : Female, 30, passenger
EJECT. PATH : Right front door
MAIS : AIS-1 Face contusion
INJ. SOURCE : Ground
CASE FACTS : Travelling on a 2-lane roadway, the door opened and occupant
fell out.
DOOR LATCH/HINGE: Suspect latch failure. No damage to vehicle.

ACCIDENT : 1984 NASS

CASE : 36 022V

VEHICLE : 1983 Dodge Diplomat, 4-dr. sedan

CRASH MODE : Rear

ROLLOVER : No

OCCUPANT : Male, 39, passenger

EJECT. PATH : Right front door

MAIS : AIS-1 Wrist sprain

INJ. SOURCE : Unknown

CASE FACTS : Travelling on a narrow roadway, vehicle was hit on the left rear corner by a vehicle coming from behind. It moved some distance forward, then was hit again on the left side by same vehicle. Damage to rear end, left side (minor dents).

DOOR LATCH/HINGE: Suspect latch failure. Slides show doors are intact, in line, and closed. Pillars are intact. Damage to vehicle overall was minimal, consisting of dents only.

ACCIDENT : 1984 NASS
CASE : 37 059T
VEHICLE : 1972 Pontiac Catalina, 4-dr sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Male, 32, driver
Male, 40, passenger
EJECT. PATH : Right front door
Right front door
MAIS : AIS-7 Head, unknown lesion
AIS-6 Skull crush
INJ. SOURCE : Unknown
Unknown
CASE FACTS : Making a left turn at an intersection, vehicle was hit on right side by an oncoming truck. It rotated 180 degrees clockwise, hit a tree with the left rear corner, rotated another 180 degrees clockwise and stopped. Damage to right side, both ends, roof crushed.

DOOR LATCH/HINGE: Unable to ascertain cause of failure. Slides show entire right side is badly distorted, right front panel is separated, and the door crushed. However, the door appears at least partly attached to the B pillar. Status of doors is not clear due to extensiveness of damage. The pillars and roof are crushed.

ACCIDENT : 1984 NASS
CASE : 53 074S
VEHICLE : 1978 Chevrolet Monte Carlo, 2-dr. sedan
CRASH MODE : Other location (top)
ROLLOVER : Yes, less than 4 quarter-turns.
OCCUPANT : Male, 26, driver
EJECT. PATH : Left front door
MAIS : AIS-3 Skull fracture
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a narrow rural road, the vehicle skidded off to the left, hit a ditch with the left side, rolled over, rotated 45 degrees clockwise and stopped upside down. Damage to top, left side, windshield.
DOOR LATCH/HINGE: Suspect latch failure. The left door appears to be in line and intact, but open. Left A pillar was tilted sideways when roof was crushed. Suspect either the impact with ditch or the roof crush forced the door to spring open. No major damage was seen to or near the left door, only dents.

ACCIDENT : 1984 NASS

CASE : 39 021S

VEHICLE : 1981 Plymouth Horizon, 5-dr./4-dr. hatchback

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Female, 42, driver

EJECT. PATH : Left front door

MAIS : AIS-7 Head, unknown lesion

INJ. SOURCE : Unknown

CASE FACTS : Travelling on a 6-lane highway, the vehicle swerved off to the right, hit the right curb head-on, rotated 180 degrees clockwise, returned to the road and stopped. Damage to front end, left side.

DOOR LATCH/HINGE: Suspect latch failure. Slides show left front door is dented in the sheet metal around the hinge, but in line and closed; pillars intact; window frame slightly bent out of line; the handle on the left front door is missing; possibly broken off during accident.

ACCIDENT : 1984 NASS
CASE : 09 269S
VEHICLE : 1979 Dodge Omni, 2-dr. sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Female, 13, passenger
EJECT. PATH : Right front door
MAIS : AIS-7 Unknown
INJ. SOURCE : Non-contact
CASE FACTS : Travelling on a 4-lane highway, vehicle swerved into the
oncoming side. It was hit on the right side by an oncoming
car, rotated 90 degrees clockwise and stopped. Damage to
right side, top.
DOOR LATCH/HINGE: Report states that the door latch and hinge failed.
Slides show right door is open, out of line and detached at
the top hinge; also, the striker is broken off. It is
theorized that as the right rear panel was hit, which may
have broken the latch. Pillars intact but B pillar tilted
sideways.

ACCIDENT : 1984 NASS

CASE : 08 066T

VEHICLE : 1980 Ford Mustang, 2-dr. sedan

CRASH MODE : Front

ROLLOVER : No

OCCUPANT : Female, 56, passenger

EJECT. PATH : Right front door

MAIS : AIS-7 Unknown

INJ. SOURCE : Unknown

CASE FACTS : Travelling on a 2-lane divided highway, vehicle swerved off to the right, went into a drainage ditch, hit the side of ditch with right side, and hit the drainage hole with the right front side. Damage to right side consisting of minor dents.

DOOR LATCH/HINGE: Suspect latch failure. Doors are in line and closed.

Report states the mud on bottom of the right door suggested it opened and hit the ground.

ACCIDENT : 1984 NASS
CASE : 07 033T
VEHICLE : 1963 Mercury Comet, 4-dr. sedan
CRASH MODE : Front at angle
ROLLOVER : No
OCCUPANT : Female, 21, driver
EJECT. PATH : Left front door
MAIS : AIS-1 Neck strain
INJ. SOURCE : Impact force
CASE FACTS : Travelling on a 2-lane road, the vehicle swerved to the left,
went onto the shoulder, returned to road, hit an oncoming car
with the left front corner, rotated 90 degrees clockwise and
stopped. Damage to left front corner, hood.
DOOR LATCH/HINGE: Suspect latch failure. The left front door is open but
intact, in line and attached. Believe the striker was torn
off. Left front panel crushed. Pillars intact.

ACCIDENT : 1984 NASS

CASE : 04 054T

VEHICLE : 1969 Chevrolet Nova Sport Coupe, 2-dr. sedan

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Male, 1, passenger

EJECT. PATH : Right front door

MAIS : AIS-3 Liver laceration

INJ. SOURCE : Tires

CASE FACTS : Vehicle was making a sharp left turn. Occupant fell from vehicle, then was hit by the vehicle on the right side. No damage to car.

DOOR LATCH/HINGE: Suspect door latch failure. No damage. Report says the right door latch works but is hard to use. The car was old; rust and previous damage may have affected door's performance.

ACCIDENT : 1984 NASS
CASE : 03 188V
VEHICLE : 1975 Chevrolet Vega, station wagon
CRASH MODE : Front
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Female, 17, passenger
EJECT. PATH : Right front door
MAIS : AIS-1 Brain concussion
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a 6-lane highway, vehicle scraped against the right mountable curb. It then turned over to the right, rolled on the grassy shoulder, rotated 90 degrees clockwise and stopped. Damage to right front side, windshield, rear window.
DOOR LATCH/HINGE: Suspect latch failure. Right front door is in line, slightly open. Damage overall was minimal, consisting of dents. Report states that at the time of inspection, both front doors were jammed and would not open.

ACCIDENT : 1984 NASS

CASE : 03 185T

VEHICLE : 1980 Honda Civic, 3-dr./2-dr. hatchback

CRASH MODE : Front

ROLLOVER : No

OCCUPANT : Male, 37, driver

EJECT. PATH : Left front door

MAIS : AIS-2 Brain concussion

INJ. SOURCE : Unknown

CASE FACTS : Travelling on a 4-lane roadway, vehicle hit a car ahead of it
with the left front corner. Damage to left front corner,
front end, hood.

DOOR LATCH/HINGE: Suspect latch failure. Doors are in line and closed.

The left front panel is crushed. Pillars are intact.

Suspect the impact to the left front corner caused the door
to spring open.

REMARKS: Occupant weighed 380 lbs. so door may have opened
when he hit it.

ACCIDENT : 1984 NASS
CASE : 02 199T
VEHICLE : 1972 Chevrolet Nova, 2-dr. sedan
CRASH MODE : Left side
ROLLOVER : No
OCCUPANT : Male, 25, driver
Male, 23, passenger
EJECT. PATH : Left front door
Left front door
MAIS : AIS-2 Brain concussion
AIS-7 Abdomen, unknown lesion
INJ. SOURCE : Unknown
Unknown
CASE FACTS : Travelling on an exit ramp of a 4-lane highway, vehicle
swerved off to the left, rotated 45 degrees clockwise, hit a
sign post with the left side, then crossed the road and went
off to the right. Damage to left side, consisting of dents.
DOOR LATCH/HINGE: Suspect latch failure. The left door had a deep dent in
the metal just beneath the handle, but was in line and
appeared to be closed. There was a slight bend in the sheet
metal around the hinges. Suspect the door sprang open after
hitting the sign post.

ACCIDENT : 1984 NASS

CASE : 37 159S

VEHICLE : 1967 Buick GS 400, 2-dr. sedan

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 20, driver

EJECT. PATH : Left front door

MAIS : AIS-3 Heart contusion

INJ. SOURCE : Steering assembly

CASE FACTS : Crossing an intersection, vehicle was hit on the left front side by a vehicle coming from the left. It then side-swiped another car which was to the right of it, rotated 90 degrees clockwise and stopped. Damage to left side, front end.

DOOR LATCH/HINGE: Suspect latch failure. The left door is badly dented and buckled inward, but is attached at both hinges and in line. Pillars intact. Left front panel crushed. Suspect the impact to the left front side caused the door to open.

ACCIDENT : 1984 NASS
CASE : 33 100K
VEHICLE : 1978 Mercury Bobcat, 3-dr./2-dr. hatchback
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Male, 51, driver
EJECT. PATH : Left front door
MAIS : AIS-1 Wrist contusion
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a 2-lane roadway, vehicle began to skid to the right. It then swerved to the left, rotated 180 degrees counterclockwise, went into the oncoming lane, and was hit on the right by an oncoming car. After this impact it rotated 90 degrees counterclockwise, returned to its lane and was hit again on the right by another car. It went backwards, then stopped. Damage to right side.
DOOR LATCH/HINGE: Suspect latch failure. Slides show left door is slightly open, but in line and attached; left pillars intact; there is a dent in the sheet metal around the hinge, which the report states is due to the door coming open. It is theorized that the door sprang open during one of the right side impacts.

ACCIDENT : 1984 NASS

CASE : 32 198T

VEHICLE : 1984 Ford Thunderbird, 2-dr. sedan

CRASH MODE : Front

ROLLOVER : No

OCCUPANT : Female, 88, passenger

EJECT. PATH : Right front door

MAIS : AIS-3 Hip dislocation

INJ. SOURCE : Instrument panel

CASE FACTS : Travelling on a narrow road, vehicle swerved off to the right, hit a pole with the right front side and rotated 45 degrees clockwise. Damage to right side, front, hood.

DOOR LATCH/HINGE: Report states that the right door is sprung. Slides show door is attached and in line, but open. Pillars intact. No information is available on the latch, but suspect latch failure.

ACCIDENT : 1984 NASS
CASE : 78 104C
VEHICLE : 1974 Chevrolet Monte Carlo, 2-dr. sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Male, 49, passenger
EJECT. PATH : Right front door
MAIS : AIS-1 Ankle, unknown lesion
INJ. SOURCE : Tires
CASE FACTS : Vehicle hit a pedestrian on the right side of the road. No
damage to car indicated.
DOOR LATCH/HINGE: Suspect latch failed. No damage to car.

ACCIDENT : 1984 NASS

CASE : 82 080N

VEHICLE : 1974 Chevrolet Vega, 2-dr. hatchback

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 29, driver

EJECT. PATH : Left front door

MAIS : AIS-4 Brain laceration

INJ. SOURCE : Ground

CASE FACTS : Crossing an intersection, vehicle was hit on left side by an approaching car. It rotated 180 degrees counterclockwise. Dents on left side.

DOOR LATCH/HINGE: Report indicates the left front door swung open. Slides show metal near the top hinge buckles so that the door is out of line, though the door itself is intact. Suspect latch failure. Impact to the left panel may have caused the damage.

ACCIDENT : 1984 NASS
CASE : 82 130P
VEHICLE : 1973 Plymouth Gold Duster, 2-dr. sedan
CRASH MODE : Rear end
ROLLOVER : No
OCCUPANT : Male, 43, driver
EJECT. PATH : Left front door
MAIS : AIS-1 Neck strain
INJ. SOURCE : Seat, back support
CASE FACTS : Vehicle was hit on the left rear corner by a pickup
travelling in the same direction. Damage to rear side and
trunk. After collision, vehicle rotated 90 degrees clockwise
and stopped.
DOOR LATCH/HINGE: Suspect latch failure. Doors are intact, closed and in
line. Damage occurred only to the rear end.

ACCIDENT : 1984 NASS
CASE : 76 040T
VEHICLE : 1967 Ford Futura, 2-dr. sedan
CRASH MODE : Right side
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Male, 21, driver
EJECT. PATH : Left front door
MAIS : AIS-1 Neck contusion
INJ. SOURCE : Side interior surface
CASE FACTS : Returning to the right lane after passing another car,
vehicle swerved sideways off to the right, went down a slight
slope and turned over. Damage to right side, front end, top,
left side.
DOOR LATCH/HINGE: Suspect latch failure. Slides show the left door is
open, but in line and attached, though somewhat dented near
the hinge. Pillars intact.

ACCIDENT : 1984 NASS
CASE : 76 031T
VEHICLE : 1964 Volkswagen Bug, 2-dr. sedan
CRASH MODE : Non-collision
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Female, 20, passenger
EJECT. PATH : Right front door
MAIS : AIS-2 Brain concussion
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a 2-lane roadway, vehicle swerved off to the left, rotated 90 degrees clockwise, turned over, and landed upright. Damage to right side, top, hood.
DOOR LATCH/HINGE: Suspect latch/hinge failure. Slides show the right door is open, is attached only at top hinge, is buckled inward at the bottom and out of line; the pillars are intact. Report states "both doors held on by just upper hinge."

ACCIDENT : 1984 NASS

CASE : 61 079V

VEHICLE : 1979 Ford Thunderbird, 2-dr. sedan

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Female, 51, driver

EJECT. PATH : Left front door

MAIS : AIS-3 Skull fracture

INJ. SOURCE : Unknown

CASE FACTS : Travelling on a 6-lane highway, vehicle swerved off to the left, rotated 90 degrees clockwise, returned sideways to the road, and was hit on the right side by a truck. Damage to right side, top, front end.

DOOR LATCH/HINGE: Suspect latch failure. Slides show the left door is intact and in line, the left side panels and pillars are intact. Suspect the impact on the right side may have caused the door to spring open.

ACCIDENT : 1984 NASS
CASE : 60 84W
VEHICLE : 1963 Ford Falcon, station wagon
CRASH MODE : Other location
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Male, 29, driver
EJECT. PATH : Right front door
MAIS : AIS-1 Back strain
INJ. SOURCE : Impact force
CASE FACTS : Travelling on a two-lane road, vehicle skidded sideways,
rotated 90 degrees counterclockwise, moved sideways with its
rear tires off the road, and overturned. Damage to front
end, top, sides.
DOOR LATCH/HINGE: Unable to tell. Suspect latch failure. Right front door
is completely crushed and bent almost in half, but appears to
be attached at both hinges. A pillar is intact.
REMARKS: From the pattern of the damage, it is believed that
the door sprang open, then was crushed during the vehicle's
overturn. Such extensive damage to the door would not be
likely to occur if the door was closed.

ACCIDENT : 1984 NASS

CASE : 60 069S

VEHICLE : 1971 Oldsmobile Delta 88, 2-dr. sedan

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 27, driver

EJECT. PATH : Left front door

MAIS : AIS-7 Unknown

INJ. SOURCE : Unknown

CASE FACTS : Travelling on a 2-lane road, vehicle swerved into the
oncoming lane and side-swiped an approaching vehicle with the
left front side. Damage to left side, hood, front end.

DOOR LATCH/HINGE: Suspect latch failure due to striker being torn off.

Slides show left front door is open and deeply dented, but in
line and attached. Pillars intact.

ACCIDENT : 1984 NASS
CASE : 52 038T
VEHICLE : 1984 Chevrolet Chevette, 3-dr./2-dr. hatchback
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Female, 27, driver
EJECT. PATH : Right front door
MAIS : AIS-2 Brain concussion
INJ. SOURCE : Unknown
CASE FACTS : Crossing an intersection with a 4-lane divided highway,
vehicle was hit on right front side by a car coming from the
right. Damage to right side, front end, hood.
DOOR LATCH/HINGE: Suspect latch failure. The right front door is open,
buckled inward at its forward end, but appears to be attached
and in line. Suspect the impact to the right door and front
panel broke or release the latch and opened the door.
Pillars intact.

ACCIDENT : 1984 NASS

CASE : 53 036T

VEHICLE : 1978 Chevrolet Camaro Rally Sport, 2-dr. sedan

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Male, 17, driver
Male, 17, passenger
Male, 16, passenger

EJECT. PATH : Left front door
Rear window
Rear window

MAIS : AIS-1 Brain concussion
AIS-1 Wrist laceration
AIS-1 Neck strain

INJ. SOURCE : Unknown
Backlight (rear window)
Unknown

CASE FACTS : Travelling on a 2-lane roadway, vehicle swerved off to the left, hit a fence post with left rear panel, hit a bush with front right corner, rotated 90 degrees counterclockwise, hit three trees with the right side, then another tree with right rear corner. Damage to right side, rear panels, rear window.

DOOR LATCH/HINGE: Suspect latch failure. Left door is open, but undamaged and in line. Suspect the door sprang open during one of the impacts. Pillars intact.

ACCIDENT : 1983 NASS

CASE : 53 020T

VEHICLE : 1980 Buick Regal, 2-dr. sedan

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Male, 17, driver

EJECT. PATH : Right door

MAIS : AIS-5 Brain concussion

INJ. SOURCE : Unknown

CASE FACTS : Vehicle was travelling on a 2-lane roadway. It swerved, rotated 90 degrees clockwise, was hit on the right side by a car coming up the road, rotated 90 degrees clockwise and went off the road. Damage to right side and windows, left rear side.

DOOR LATCH/HINGE: Suspect latch failure. In the slides, the right A pillar and B pillar are crushed, but the right door hinges are intact; the door is open but attached and in line.

ACCIDENT : 1983 NASS

CASE : 80 124P

VEHICLE : 1978 Ford Fiesta, 2-dr. sedan

CRASH MODE : Left front oblique impact

ROLLOVER : Yes, less than 4 quarter-turns

OCCUPANT : Male, 18, driver

Male, 17, passenger

EJECT. PATH : Right window

Right door

MAIS : AIS-2 Neck fracture

AIS-1 Neck abrasion

INJ. SOURCE : Ground

Ground

CASE FACTS : Travelling on a 2-lane roadway, vehicle went into the oncoming lane, hit an approaching vehicle with the left front corner, swerved to the right shoulder, turned over, and skidded on its top from some distance. Damage to left side, hood, top.

DOOR LATCH/HINGE: Suspect latch failure. No slides are available, but damage indicated to right door in the report is minimal, consisting of dents, and the report states the right door is ajar.

ACCIDENT : 1983 NASS

CASE : 51 306T

VEHICLE : 1984 Olds Cutlass, 2-dr. sedan

CRASH MODE : All over

ROLLOVER : No

OCCUPANT : Female, 57, driver

Female, 39, front seat passenger

EJECT. PATH : Right door

Right door

MAIS : AIS-1 Head

AIS-1 Chest

INJ. SOURCE : Mirror

Side interior

CASE FACTS : The case vehicle lost control when it tried to avoid a collision with a vehicle making a left turn. The case vehicle skidded and collided with two on-coming cars. This caused severe damage on the front, right quarter panel, right door and rear side of the vehicle.

DOOR LATCH/HINGE: There is right door sheet metal damage, but the hinge is retained. It is suspected that the door latch popped open. The investigator reported that the right door was wide open.

ACCIDENT : 1983 NASS
CASE : 09 138T
VEHICLE : 1976 Ford Granada, 4-dr. sedan
CRASH MODE : Right side impact
ROLLOVER : No
OCCUPANT : Female, 11 years old. Front seat occupant.
EJECT. PATH : Right front door
MAIS : AIS-7 Injured, unknown severity
INJ. SOURCE : Unknown
CASE FACTS : The case vehicle was struck on the right side compartment area by an on-coming vehicle, 1981 Ford LTD, when the driver was making a left turn at the intersection of a six-lane divided highway. This caused severe damage on the right side of the vehicle including the roof, doors and compartment/rear quarter panel.
DOOR LATCH/HINGE: Right front door latch failure.
REMARK: B pillar was disengaged from frame, and the striker was disengaged with the lock.

ACCIDENT : 1983 NASS
CASE : 06 153V
VEHICLE : 1983 Pontiac Grand Prix LJ, 2-dr. sedan
CRASH MODE : Left side impact
ROLLOVER : No
OCCUPANT : Male, 37, driver
EJECT. PATH : Left door
MAIS : AIS-7 Injured, unknown severity
INJ. SOURCE : Unknown
CASE FACTS : The case vehicle lost control when travelling on a two-lane road, and then ran off the road and struck a small tree.
This caused extensive damage on the left side door and rear quarter panel. B pillar twisted.
DOOR LATCH/HINGE: Latch was not damaged but the striker was pulled out of the B pillar.
REMARK: Severe damage on rear quarter panel made the B pillar twist and deform. This caused the failure of the anchorage.

ACCIDENT : 1983 NASS
CASE : 26 082T
VEHICLE : 1976 Chevrolet Nova, 2-dr. sedan
CRASH MODE : Primary front impact, secondary left side impact on the door
ROLLOVER : No
OCCUPANT : Female, 31, driver
EJECT. PATH : Left door
MAIS : AIS-1 Neck
INJ. SOURCE : Side interior
CASE FACTS : The case vehicle collided (90 degree angle) with a 1975
Plymouth Valiant at the intersection of a five-lane urban
road. This caused both vehicles to rotate 90 degrees, and
causes damage on the front end and left side of the case
vehicle.
DOOR LATCH/HINGE: It is suspected that the left door latch popped open
because both door lock and striker components were retained
intact on the door and B pillar.
REMARK: The minor impact at the B pillar/quarter panel area
and occupant striking side door interior may have caused the
left door to pop open.

ACCIDENT : 1983 NASS
CASE : 12 054W
VEHICLE : 1972 Ford Pinto, station wagon
CRASH MODE : Front impact with rollover
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Male, 26, driver
EJECT. PATH : Left front door
MAIS : AIS-1 Face
INJ. SOURCE : Steering assembly
CASE FACTS : The case vehicle lost control when it approached a bridge
and collided with bridge parapet. Subsequently, the vehicle
rolled and caused severe roof damage. Also, the vehicle
sustained direct damage around right front structure, right
side structure and undercarriage.
DOOR LATCH/HINGE: Suspect that the left front door popped open during
rollover because the hinges and lock of the door were
intact. No picture of the B pillar and door striker was
available.
REMARK: The roof of the vehicle was crushed to the belt-
level on the right side and the rear. The rear and the left
doors were popped open, and right door was jammed.

ACCIDENT : 1983 NASS
CASE : 10 111S
VEHICLE : 1978 Olds Cutlass, station wagon
CRASH MODE : Front oblique collision with a train
ROLLOVER : Yes
OCCUPANT : Female, 37, driver
Male, 4, passenger
EJECT. PATH : Left front door
right front door
MAIS : AIS-7 Injured, unknown severity
AIS-7 Injured, unknown severity
INJ. SOURCE : Unknown
Unknown
CASE FACTS : The case vehicle collided with a train when travelling on a
two lane road. The train impact the right front of the
vehicle apprxoimately at a 65 degree angle and then caused
the vehicle to roll. Both occupants were ejected left/right
front doors.
DOOR LATCH/HINGE: Unable to tell.
REMARKS: The vehicle structure was totally disintegrated
and the compartment area was torn apart.

ACCIDENT : 1983 NASS

CASE : 10 001S

VEHICLE : 1969 Mercury Marquis, 4-dr. sedan

CRASH MODE : Left side impact with a fixed object

ROLLOVER : No

OCCUPANT : Male, 18, second seat passenger

EJECT. PATH : Rear left door

MAIS : AIS-2 Pelvis

INJ. SOURCE : Ground

CASE FACTS : The case vehicle lost control, travelling in a residential area. The left side hit a ditch/culvert, and damaged the lower portion of the rear side door and quarter panel. The rear left door panel was torn off and the floor under the rear set separated.

DOOR LATCH/HINGE: The latch lock is separated from the striker. What happened to the door hinges was not clear.

REMARK: The structure damage was so severe that an improved door latch mechanism may not have helped the situation.

ACCIDENT : 1983 NASS
CASE : 51 010T
VEHICLE : 1969 Ford Mustang, 2-dr. hardtop
CRASH MODE : Right front impact with guardrail. Left front impact with
bridge rail.
ROLLOVER : No
OCCUPANT : Male, 46, front seat passenger
EJECT. PATH : Right door
MAIS : AIS-2 Back
INJ. SOURCE : Unknown
CASE FACTS : The case vehicle impacted guardrail when it merged from a 4-
lane road to a 2-lane bridge. Then the driver lost control
and the vehicle impacted the bridge rail. This caused
severe damage on the left front and right side structures.
DOOR LATCH/HINGE: Right door was gouged and the lock mechanism was
damaged. However, the door was properly retained in the
side. Suspect that latch popped open during impact.
REMARKS: Damage nearby the locking mechanism.

ACCIDENT : 1983 NASS
CASE : 87 280T
VEHICLE : 1967 VW "Bug", 2-dr sedan
CRASH MODE : Non-collision
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Male, 20, driver
EJECT. PATH : Left door
MAIS : AIS-2 Shoulder
INJ. SOURCE : Ground
CASE FACTS : The case vehicle lost control when travelling at a three leg intersection of a two-lane rural road. The vehicle started to roll when the front tire got into shoulder. Severe damage on the roof, front/rear structures.
DOOR LATCH/HINGE: Suspect that the left door latch popped open during the event.
REMARKS: Slide shows that the left door can not be closed completely because the roof and window frame are damaged. The hinges are properly aligned.

ACCIDENT : 1983 NASS

CASE : 83 098T

VEHICLE : 1972 Toyota Corolla, 2-dr sedan

CRASH MODE : Non-collision

ROLLOVER : Yes, 4 or more quarter-turns

OCCUPANT : Female, 33, driver

EJECT. PATH : Left door

MAIS : AIS-3 Neck

INJ. SOURCE : Ground

CASE FACTS : The case vehicle was out of control when the driver was making a sharp turn on a two-lane road. The vehicle slipped off the road and rolled. This caused severe damage on the left side/roof areas, and left door opened.

DOOR LATCH/HINGE: Suspected that latch popped open during accident.

REMARKS: The slide shows that the door is properly aligned and closed. The report does not mention any door damage except that the left front door was open during the event.

ACCIDENT : 1983 NASS

CASE : 26 017T

VEHICLE : 1976 Pontiac Grand Prix, 2-dr. sedan

CRASH MODE : Other location (top)

ROLLOVER : Yes, 4 or more quarter-turns

OCCUPANT : Male, 29, driver
Male, 34, passenger

EJECT. PATH : Left door
Left door

MAIS : AIS-3 Chest fracture
AIS-1 Head laceration

INJ. SOURCE : Steering assembly
Roof side rails

CASE FACTS : Travelling on a 2-lane road, vehicle swerved off to the right, hit a utility pole on the right front corner, went over a barbed wire fence, turned over and stopped upright. Damage to top, hood, trunk, right side, front end, left front panel.

DOOR LATCH/HINGE: Report states the left door was sprung, and opens all the way around to the fender. Suspect latch failure caused the door to spring open. From the slides it appears the hinges are intact, and that the crushing and partial separation of the left front panel allows the door to open all the way around.

ACCIDENT : 1983 NASS
CASE : 58 057P
VEHICLE : 1978 Plymouth Volare, 4-dr. sedan
CRASH MODE : Left side
ROLLOVER : No
OCCUPANT : Female, 50, passenger
EJECT. PATH : Left front door
MAIS : AIS-3 Thigh fracture
INJ. SOURCE : Exterior on tires
CASE FACTS : Travelling on a 6-lane highway, vehicle was crossing an
intersection with a small road. It was hit on the left side
by a car which was crossing the highway. The case vehicle
skidded to the right and stopped. Damage to left side.
DOOR LATCH/HINGE: Suspect latch failure. The left front door is dented,
but in line and attached at both hinges. Suspect the impact
to the left side caused it to spring open. Pillars are
intact.

ACCIDENT : 1983 NASS

CASE : 76 011T

VEHICLE : 1970 Chevrolet Nova, 4-dr. sedan

CRASH MODE : Left side with tree

ROLLOVER : No

OCCUPANT : Male, 29, driver
Female, 23, passenger

EJECT. PATH : Left front door
Left front door

MAIS : AIS-4 Spleen rupture
AIS-3 Kidney contusion

INJ. SOURCE : Steering assembly
Unknown

CASE FACTS : Vehicle was travelling on a 2-lane road. While passing another vehicle, it lost control, rotated 90 degrees counter-clockwise, skidded sideways, hit some trees with the left rear corner, then hit the other vehicle, which had stopped and turned sideways, with the right front corner. Damage to windows, left and right doors.

DOOR LATCH/HINGE: Suspect latch failed. Left front door is open, bent and dented, but in line and attached at both hinges. Pillars intact. Suspect force of the left rear impact caused the door to spring open.

ACCIDENT : 1983 NASS

CASE : 13 117T

VEHICLE : 1982 Chevrolet Z-28 Camaro, 3-dr./2-dr. hatchback

CRASH MODE : Right side

ROLLOVER : Yes, less than 4 quarter turns

OCCUPANT : Male, 19, passenger

EJECT. PATH : Right front door

MAIS : AIS-5 Brain concussion

INJ. SOURCE : Unknown

CASE FACTS : Rounding a sharp left-hand curve on a narrow road, vehicle swerved off to the right, hit the side of a ditch with the right side, rolled over and rotated 90 degrees counterclockwise. Damage to right side, top, left front panel.

DOOR LATCH/HINGE: Suspect latch failure. Right door is open, crushed and bent upward out of line, but appears to be attached at both hinges. Suspect the door sprang open upon impact, then was damaged during vehicle rollover. Pillars are intact.

ACCIDENT : 1983 NASS

CASE : 30 201S

VEHICLE : 1976 Datsun 280Z, 3-dr./2-dr. hatchback

CRASH MODE : Top

ROLLOVER : Yes, less than 4 quarter-turns.

OCCUPANT : Male, 27, driver
Male, 29, passenger

EJECT. PATH : Left front door
Left front door

MAIS : AIS-2 Brain concussion
AIS-7 Head, unknown lesion

INJ. SOURCE : Unknown
Unknown

CASE FACTS : Rounding a right-hand curve on a narrow roadway, vehicle swerved off to the left, rotated 90 degrees clockwise, hit a sign post with the left side, rolled over and skidded forward on its top. Damage to left side, top.

DOOR LATCH/HINGE: Report states the door lock is broken and left door is ajar. In the slides, the left door is slightly open and deeply dented in the B pillar area, but is in line and attached. Pillars intact. Suspect latch failure.

ACCIDENT : 1983 NASS

CASE : 54 178V

VEHICLE : 1974 Chevrolet Camaro, 2-dr. sedan

CRASH MODE : Front

ROLLOVER : No

OCCUPANT : Male, 29, driver

EJECT. PATH : Right door

MAIS : AIS-2 Brain concussion

INJ. SOURCE : Windshield

CASE FACTS : Travelling on a 2-lane roadway, vehicle was hit on the right front corner by a car which had come into its lane to pass a truck. The case vehicle rotated 90 degrees clockwise and skidded sideways. Damage to front, hood, right front side, left front side.

DOOR LATCH/HINGE: Suspect latch failure. Right door is deeply dented and open, but is attached at both hinges, and appears to be in line. Right A pillar is intact but appears to have been swept back by the frontal impact.

ACCIDENT : 1983 NASS

CASE : 04 241V

VEHICLE : 1978 Ford Mustang Cobra, 3-dr./2-dr. hatchback

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Unknown

EJECT. PATH : Right front door

MAIS : AIS-U

INJ. SOURCE : None

CASE FACTS : Completing a left turn at an intersection, vehicle was hit
on right middle side by a car coming from the right.

It skidded forward and stopped. Damage to right side,
windshield, rear window.

DOOR LATCH/HINGE: Suspect latch failure. Right door is bent outward on
the top, but otherwise intact. The door is open, but ap-
pears to be in line and attached at the hinges. Some metal
strain in the hinge area. Pillars intact. Suspect the door
was bent outward and sprang open due to occupant impact.

ACCIDENT : 1983 NASS
CASE : 57 294S
VEHICLE : 1981 Toyota Corolla, 2-dr. sedan
CRASH MODE : Left side
ROLLOVER : No
OCCUPANT : Female, 20, driver
EJECT. PATH : Left door
MAIS : AIS-7 Unknown
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a 4-lane highway, vehicle drifted into the
oncoming side, was hit on the left side by an oncoming
vehicle, rotated 90 degrees counterclockwise, was hit again
on the left rear side by a car coming from behind, and rotated
another 90 degrees counterclockwise. Damage to left side.
DOOR LATCH/HINGE: Unable to tell. The left door was intact, in line and
attached. However, the left B pillar, left rear panel and
interior surface were completely separated as a result of the
direct impact, and the driver was ejected through the gap
left behind. The door latch was broken when the panel
separated, leaving the door otherwise intact.

ACCIDENT : 1983 NASS
CASE : 58 115T
VEHICLE : 1982 Subaru GL, 4-dr. sedan
CRASH MODE : Left side
ROLLOVER : Yes, 4 or more quarter turns
OCCUPANT : Female, 27, driver
EJECT. PATH : Left front door
MAIS : AIS-1 Thigh contusion
INJ. SOURCE : Ground
CASE FACTS : Travelling on a 4-lane highway, vehicle skidded, rotated 90 degrees clockwise, went onto the right shoulder, rotated another 90 degrees clockwise, rolled over and hit some trees with the left side. Damage to right side, left front corner, trunk. Damage to right side was due to skidding sideways on the shoulder.
DOOR LATCH/HINGE: Suspect latch failure. Left door appears to be intact, in line and closed. Pillars intact. Damage to the whole car was limited to minor dents.

ACCIDENT : 1983 NASS
CASE : 77 010T
VEHICLE : 1969 Mercedes 250 SL, 2-dr. sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Female, 37, passenger
EJECT. PATH : Right door
MAIS : AIS-1 Wrist laceration
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a 4-lane divided highway, the left front wheel of the vehicle hit the left curb. The vehicle went on the median strip, rotated 180 degrees counterclockwise. The front part of the car then broke off. The rest of the vehicle skidded and rotated counterclockwise across the oncoming lane and then stopped. Damage to front, sides, top.
DOOR LATCH/HINGE: Report states that the right door was sheared off.
Suspect latch and hinge failure. In the slides, it appears the door striker is torn off. However, the door is also loosened at the top hinge and is out of line.
Pillars are intact. Suspect rust and age weakened the car and its door mechanisms.

ACCIDENT : 1983 NASS

CASE : 77 125K

VEHICLE : 1983 BMW 320i, 2-dr. sedan

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 36, driver

EJECT. PATH : Left door

MAIS : AIS-1 Head laceration

INJ. SOURCE : Ground

CASE FACTS : Travelling on a 4-lane highway, vehicle went across the grassy median, rotated slightly clockwise, hit the side of a truck coming in the opposite direction with its left rear side, rotated 90 degrees clockwise and stopped. Damage to left door, left rear side, trunk, rear end.

DOOR LATCH/HINGE: Suspect latch failure. Left door is intact, appears to be in line, though slightly dented in the sheet metal around the hinges. Suspect force of impact on the left rear side caused the door to spring open.

ACCIDENT : 1983 NASS

CASE : 83 064P

VEHICLE : 1979 Dodge Omni 024, 3-dr./2-dr. hatchback

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Male, 21, driver

Male, 21, passenger

Male, 20, passenger

EJECT. PATH : Right door

Right door

Right door

MAIS : AIS-2 Ear avulsion

AIS-2 Brain concussion

AIS-2 Shoulder fracture

INJ. SOURCE : Impact force

Ground

Ground

CASE FACTS : Travelling on narrow roadway, vehicle swerved to the left side of road, rotated 90 degrees counterclockwise, was hit on right side by an oncoming vehicle, and rotated another 90 degrees counterclockwise. Damage to right side, rear end.

DOOR LATCH/HINGE: Report states right door is ripped apart and ripped open.

Slides show it bent outward and the outer panel separated, but the door still attached at the hinges. Suspect latch failure; suspect the door sprang open upon vehicle impact and then was damaged in the right side collision.

ACCIDENT : 1983 NASS

CASE : 83 093K

VEHICLE : 1959 Buick Invicta, 2-dr. sedan

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Female, 19, passenger

EJECT. PATH : Right door

MAIS : AIS-1 Rib fracture

INJ. SOURCE : Unknown

CASE FACTS : Backing out of a driveway, vehicle was hit on right rear corner by a vehicle coming from the right. It rotated 180 degrees clockwise and stopped. Damage to right rear panel.

DOOR LATCH/HINGE: Suspect latch failure. Right door is intact and in line, though open. Pillars intact. Suspect the striker was torn off.

ACCIDENT : 1983 NASS

CASE : 30 180V

VEHICLE : 1973 Oldsmobile Cutlass, 2-dr. sedan

CRASH MODE : Undercarriage

ROLLOVER : No

OCCUPANT : Male, 29, driver

EJECT. PATH : Left door

MAIS : AIS-1 Back abrasion

INJ. SOURCE : Ground

CASE FACTS : Backing up on the shoulder of a highway, vehicle went off to the right, hit some rocks and glass with the underside.
Damage to underside.

DOOR LATCH/HINGE: Report states the left door was sprung, window is broken.
Dents are indicated to the metal near the hinge. Latch failure is suspected, since the door is in line and attached.

ACCIDENT : 1983 NASS

CASE : 34 013T

VEHICLE : 1975 Pontiac Grand Prix, 2-dr. sedan

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Female, 35, driver

EJECT. PATH : Left door

MAIS : AIS-2 Brain concussion

INJ. SOURCE : Unknown

CASE FACTS : Making a left turn at an urban intersection, vehicle was hit on the left side by a bus coming from the left. Damage to left rear side, rear window.

DOOR LATCH/HINGE: Suspect latch failed. The left door was hit and buckled inward by impact below the C pillar. Suspect this impact damaged the latch and allowed the door to open. Door is open, but attached and in line.

ACCIDENT : 1983 NASS

CASE : 31 116V

VEHICLE : 1983 Chrysler LeBaron, 2-dr. sedan

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Female, 36, passenger

EJECT. PATH : Right door

MAIS : AIS-2 Brain concussion

INJ. SOURCE : Windshield

CASE FACTS : Making a left turn at an intersection, vehicle was hit on the right rear side by a car coming from the opposite direction. Damage to right side, rear end, windshield, rear window.

DOOR LATCH/HINGE: Suspect latch failed. The metal is bent and dented behind the C pillar, in the right rear panel, so the right door cannot close. However, the right door is intact and in line. Suspect impact to the right rear side caused the door to spring open.

ACCIDENT : 1983 NASS
CASE : 30 205V
VEHICLE : 1965 Volkswagen Beetle, 2-dr. sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Male, 22, driver
EJECT. PATH : Right door
MAIS : AIS-1 Head abrasion
INJ. SOURCE : Side/armrests
CASE FACTS : At an intersection, vehicle was making a left turn and was
hit by a car coming from the opposite direction, on the
right front corner. Damage to right front corner.
DOOR LATCH/HINGE: Suspect latch failure. Doors are intact and undamaged.

ACCIDENT : 1983 NASS

CASE : 28 012Z

VEHICLE : 1972 Chevrolet Impala, 2-dr. sedan

CRASH MODE : Rear end

ROLLOVER : No

OCCUPANT : Male, 28, passenger

EJECT. PATH : Right door

MAIS : AIS-1 Knee contusion

INJ. SOURCE : Ground

CASE FACTS : After making a right turn at an intersection, vehicle was hit on the rear by another vehicle coming in the same direction.

DOOR LATCH/HINGE: Suspect latch failure. No slides available, but in the report, damage was indicated only to the rear end.

ACCIDENT : 1983 NASS

CASE : 05 046V

VEHICLE : 1981 Toyota Corolla/Tercel, 3-dr./2-dr. hatchback

CRASH MODE : Left and Right side

ROLLOVER : No

OCCUPANT : Female, 28, driver

EJECT. PATH : Right door

MAIS : AIS-1 Upper arm laceration

INJ. SOURCE : Ground

CASE FACTS : At an intersection, vehicle was struck by a car on the left side, skidded sideways, hit the curb with the right side, rotated 360 degrees clockwise and stopped. Damage to left side, right side, rear end.

DOOR LATCH/HINGE: Report indicates door latch failure. In the slides, door is open but intact and in line. Left pillars intact.

ACCIDENT : 1983 NASS
CASE : 05 153T
VEHICLE : 1977 Mercury Monarch, 4-dr. sedan
CRASH MODE : Right front side
ROLLOVER : No
OCCUPANT : Female, 44, driver
EJECT. PATH : Right front door
MAIS : AIS-2 Pelvis fracture
INJ. SOURCE : Ground
CASE FACTS : Travelling on a 4-lane divided highway, vehicle went across the median strip, and was hit on the right front corner by a car travelling on the other side. Rotated 90 degrees counterclockwise and stopped. Damage to right front and rear sides, left rear side.
DOOR LATCH/HINGE: Suspect latch and hinge failure. Report states right front door "thrown open" and "pulled out." In the slides, the door is detached in the top hinge, loosened in the bottom hinge, and open. A pillar tilted backwards. Suspect the door sprang open and the hinges were damaged due to the impact to the right front panel.

ACCIDENT : 1983 NASS
CASE : 07 112V
VEHICLE : 1976 Ford Pinto, 3-dr./2-dr. hatchback
CRASH MODE : Front right side
ROLLOVER : No
OCCUPANT : Female, 18, passenger
EJECT. PATH : Right door
MAIS : AIS-1 Neck strain
INJ. SOURCE : Impact force
CASE FACTS : Vehicle hit a parked car on the side of the road with the
right front corner. Damage to right front side, rear end.
DOOR LATCH/HINGE: Suspect latch failure. Right door appears to be intact
and undamaged, even though right front panel was separated.
Pillars intact.

ACCIDENT : 1983 NASS

CASE : 07 136S

VEHICLE : 1968 Oldsmobile Cutlass Convertible

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 22, driver

EJECT. PATH : Left door

MAIS : AIS-7 Unknown

INJ. SOURCE : Unknown

CASE FACTS : Travelling on a 2-lane roadway, vehicle went off to the right, skidded sideways, hit a mailbox with the left side, then hit an electric junction box with left front corner. Damage to left side including doors, right side.

DOOR LATCH/HINGE: Suspect latch failure. Left door was open and bent in the middle almost 90 degrees outward by the impact. Striker is ripped out of door. Pillars intact. Suspect the door sprang open and was subsequently damaged while it was open.

ACCIDENT : 1983 NASS
CASE : 26 174T
VEHICLE : 1979 Mazda GLC, 3-dr./2-dr. hatchback
CRASH MODE : Undercarriage
ROLLOVER : Yes, 4 and more quarter turns
OCCUPANT : Male, 20, passenger
EJECT. PATH : Right front door
MAIS : AIS-1 Face laceration
INJ. SOURCE : Unknown
CASE FACTS : Vehicle swerved off to the side of the road, rotated 180
degrees counterclockwise, hit a ditch with the bottom,
rotated 90 degrees clockwise, and rolled. Damage to sides,
roof, both ends.
DOOR LATCH/HINGE: Report indicates door latch failure and bond separation
of part of left and all of right A pillar. In the slides,
the right door is attached but dented and pulled out of line
by sheet metal strain. A pillar is dented in the middle.

ACCIDENT : 1983 NASS

CASE : 84 131N

VEHICLE : 1977 Chevrolet Monte Carlo, 2-dr. sedan

CRASH MODE : Front-on

ROLLOVER : No

OCCUPANT : Male, 18, driver

Male, 14, passenger

EJECT. PATH : Left door

Left door

MAIS : AIS-3 Thigh fracture

AIS-2 Face fracture

INJ. SOURCE : Unknown

Unknown

CASE FACTS : Travelling on a 2-lane road, vehicle hit a pickup head-on
which had come into its lane from the oncoming lane. Damage
to front end, hood, sides, top.

DOOR LATCH/HINGE: Suspect latch failure. Even though front was crushed,
the left door is attached and in line. A pillar is upright
but slightly dented. Suspect the frontal impact caused the
door to spring open.

ACCIDENT : 1983 NASS
CASE : 53 215S
VEHICLE : 1976 Plymouth Volare, 2-dr. sedan
CRASH MODE : Non-collision
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Female, 17, driver
 Female, 15, passenger
EJECT. PATH : Left door
 Left door
MAIS : AIS-3 Lung laceration
 AIS-1 Face abrasion
INJ. SOURCE : Unknown
 Unknown
CASE FACTS : Travelling on a narrow road, the vehicle swerved off to the
 right, rotated 90 degrees counterclockwise, rolled over, and
 stopped. Damage to top, both sides, front end.
DOOR LATCH/HINGE: Suspect latch failure. The left door is attached and in
 line, though open and dented. A pillars were crushed along
 with the roof. Suspect the door sprang open either during
 rotation or overturn.

ACCIDENT : 1983 NASS

CASE : 79 200S

VEHICLE : 1979 Porsche 924, 3-dr./2-dr. hatchback

CRASH MODE : Non-collision

ROLLOVER : Yes, 4 or more quarter turns

OCCUPANT : Male, 17, driver

Male, 16, passenger

EJECT. PATH : Left front door

Rear window

MAIS : AIS-7 Unknown

AIS-5 Brain, unknown lesion

INJ. SOURCE : Unknown

Unknown

CASE FACTS : Travelling on a 4-lane highway, vehicle swerved off to the left, rotated 180 degrees counterclockwise, went backwards some distance, rotated another 90 degrees counterclockwise and rolled over. Damage to top, sides, ends.

DOOR LATCH/HINGE: The report indicates left door latch failure. Left door was completely torn off; the A pillar was crushed along with left side of roof. Panels dented. The hinges on the A pillar appear to be broken. The left door inside and outside handles are missing, possibly broken off. Believe the striker is also torn off. The door is bent outward at the rear end, possibly due to occupant impact. Suspect the door opened due to latch failure, then became detached during vehicle rollover.

ACCIDENT : 1983 NASS

CASE : 32 165S

VEHICLE : 1972 Oldsmobile Cutlass, 2-dr. sedan

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Female, 13, passenger
Male, 17, passenger

EJECT. PATH : Right door
Right door

MAIS : AIS-6 Spinal cord severance
AIS-6 Artery severance

INJ. SOURCE : Sunvisor
Sunvisor

CASE FACTS : Travelling on a 4-lane divided highway, the vehicle rotated 90 degrees clockwise and skidded sideways. It was then hit on the right door by a car coming up the road. Damage to sides, front end, hood, trunk.

DOOR LATCH/HINGE: Report states the right door separated from hinges. In the slides, the door appears to be also broken away from the B pillar, and bent inward. Suspect the impact to the door broke the latch, broke the rear end of the door away from the B pillar, and damaged the hinges. Pillars upright but B pillar is dented, possibly due to the latch breaking loose.

ACCIDENT : 1983 NASS

CASE : 52 013T

VEHICLE : 1971 Ford Galaxie 500, 3-dr./2-dr. hatchback

CRASH MODE : Rear/Front corner

ROLLOVER : No

OCCUPANT : Male, 24, driver

EJECT. PATH : Left front door

MAIS : AIS-1 Hip laceration

INJ. SOURCE : Unknown

CASE FACTS : Vehicle was travelling on a 2-lane road and started to swerve. It rotated 90 degrees counterclockwise, hit the left curb with the front left corner, went backwards, and with the rear end, hit a bridge rail, a sign, then a tree, and then stopped. Damage to left rear side, front end, right rear side, hood.

DOOR LATCH/HINGE: Suspect latch failure. The left door was still attached, though dented and bent slightly out of line due to sheet metal strain. Pillars intact. No direct impact occurred to the doors; suspect the left door sprang open.

ACCIDENT : 1983 NASS
CASE : 12 171V
VEHICLE : 1976 Ford Maverick, 4-dr. sedan
CRASH MODE : Front
ROLLOVER : No
OCCUPANT : Male, 24, passenger
EJECT. PATH : Left rear door
MAIS : AIS-0
INJ. SOURCE : None
CASE FACTS : Making a right turn, vehicle skidded sideways, hit a culvert
pipe, went further and stopped. Damage to front end, left
side, right front side.
DOOR LATCH/HINGE: Suspect latch failure, since the left rear door is
dented, but in line and closed. All pillars are intact.

ACCIDENT : 1982 NASS

CASE : 02 042W

VEHICLE : 1969 Dodge Polara

CRASH MODE : Front at angle

ROLLOVER : No

OCCUPANT : Female, 42, passenger

EJECT. PATH : Right front door

MAIS : AIS-1 Head contusion

INJ. SOURCE : Roof side rails

CASE FACTS : At an intersection, vehicle hit the left side of a car
coming from the right. Damage to front end, right side.

DOOR LATCH/HINGE: Report states that the latch had been broken previously
and the door would not stay closed, resulting in being opened
on impact. The door itself was in line and undamaged.
Suggest latch failure.

ACCIDENT : 1982 NASS
CASE : 53-248J
VEHICLE : 1971 Datsun, Station Wagon
CRASH MODE : Left side to rear corner of a trailer
then with a car.
ROLLOVER : No
OCCUPANT : Female, 26, driver
EJECT. PATH : Left front door
MAIS : AIS-2, Pelvis
INJ. SOURCE : Unknown
CASE FACTS : The case vehicle collided on the rear corner of an out-of-control trailer and then collided with an on-coming passenger car. This caused severe damage on the left side structure.
DOOR LATCH/HINGE: Front left door hinges were retained, but the B pillar and left rear door were torn off (Damage to the left side extended to the roof); suspect this caused disengagement of the front door latch.

ACCIDENT : 1982 NASS

CASE : 56 018V

VEHICLE : 1973 American Motors Gremlin, 3-dr./2-dr. hatchback

CRASH MODE : Front-on with side of other vehicle

ROLLOVER : No

OCCUPANT : Female, 24, driver

EJECT. PATH : Left front door

MAIS : AIS-1, head laceration

INJ. SOURCE : Unknown

CASE FACTS : On a principal urban road, at an intersection, vehicle moved forward and hit the side of another vehicle which was coming from the left. Damage to front end.

DOOR LATCH/HINGE: Suspect latch failure, since the left door was intact and undamaged. Pillars were intact. Damage occurred only to the front end.

ACCIDENT : 1982 NASS
CASE : 84 061W
VEHICLE : 1968 Plymouth Roadrunner, 2-dr. sedan
CRASH MODE : Non-collision
ROLLOVER : No
OCCUPANT : Female, 19, passenger
EJECT. PATH : Right door
MAIS : AIS-1 Face contusion
INJ. SOURCE : Side interior
CASE FACTS : Coming to an intersection in a rural principal roadway,
vehicle went straight instead of turning, went off the road
and into a ditch. No damage.
DOOR LATCH/HINGE: Suspect latch failure. All other parts of car were
intact and undamaged.

ACCIDENT : 1982 NASS

CASE : 08 050T

VEHICLE : 1980 Pontiac Phoenix LJ, 2-dr. sedan

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Female, 41, driver

EJECT. PATH : Left door

MAIS : AIS-1 Neck strain

INJ. SOURCE : Unknown

CASE FACTS : Driving on a 2-lane urban road, vehicle brushed with left side against a car coming from the opposite direction.

Damage to left rear side, roof.

DOOR LATCH/HINGE: Suspect latch failure. The left door was dented and open, but in line, and attached. The roof had been crushed to below the level of the window frame. B pillar was broken at the top and tilted toward rear of the car. Suspect the downward force to the roof damaged the latch and caused the door to open.

ACCIDENT : 1982 NASS
CASE : 09 114T
VEHICLE : 1979 Buick Opel, 2-dr. sedan
CRASH MODE : Left side
ROLLOVER : No
OCCUPANT : Male, 42, driver
EJECT. PATH : Left door
MAIS : AIS-1 Face laceration
INJ. SOURCE : A pillar
CASE FACTS : At an urban intersection, vehicle was hit by a car coming from the left, rotated 90 degrees, skidded sideways and hit a third car with the left side. Damage to front end, hood, left and right front sides.
DOOR LATCH/HINGE: Report indicates latch failure. The left door was buckled inward at the middle and bent outward at the rear end, so it could not close. Suspect the impact to the left door damaged the latch and allowed it to open.

ACCIDENT : 1982 NASS
CASE : 10 102T
VEHICLE : 1980 Mazda GLC Sport, 3-dr./2-dr. hatchback
CRASH MODE : Right side
ROLLOVER : Yes, 4 or more quarter-turns.
OCCUPANT : Male, 17, driver
EJECT. PATH : Left front door
MAIS : AIS-3 Neck fracture
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a 2-lane rural road, vehicle swerved to left,
hit a pole with the right side, turned over once and
stopped. Damage to windshield, right rear side, left rear
side, rear end.
DOOR LATCH/HINGE: Suspect latch failure. Left door was intact and
attached, though dented slightly at the front end. Pillars
intact. Car was sagging to the right due to impact at
bottom right side.

ACCIDENT : 1982 NASS

CASE : 11 034V

VEHICLE : 1982 Plymouth Champ, 2-dr. hatchback

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 24, driver

EJECT. PATH : Left door

MAIS : AIS-2 Brain concussion

INJ. SOURCE : Ground

CASE FACTS : Making a left turn onto a principal urban road, vehicle was
hit on left side by another vehicle coming from left.

Damage to left side.

DOOR LATCH/HINGE: Suspect latch failure. The left door was buckled inward
at the middle, but was attached and in line. The metal was
bent outward near the hinge, so the door could not close.
Pillars intact. Suspect the impact to the door disengaged
the latch and caused the door to open.

ACCIDENT : 1982 NASS

CASE : 05 143J

VEHICLE : 1978 Mercury Cougar XR-7, 2-dr. sedan

CRASH MODE : Front

ROLLOVER : No

OCCUPANT : Female, 17 passenger
Female, 1 1/2, passenger

EJECT. PATH : Right door
Right door

MAIS : AIS-1 Face contusion
AIS-2 Brain concussion

INJ. SOURCE : Unknown
Unknown

CASE FACTS : Returning to the right lane after passing a vehicle on a 2-lane highway, vehicle hit an oncoming truck with the left front corner. It went forward, then turned 90 degrees clockwise. Damage to top, sides, front end.

DOOR LATCH/HINGE: Suspect latch failure. Right door was open, but intact, in line and attached. Pillars intact. Though left side was crushed, right side was only dented. Suspect the door flew open on initial vehicle impact.

ACCIDENT : 1982 NASS

CASE : 33 051T

VEHICLE : 1972 Buick Opel 1900, 4-dr. sedan

CRASH MODE : Non-collision

ROLLOVER : Yes, 4 or more quarter-turns.

OCCUPANT : Male, 20, driver
Female, 20, passenger

EJECT. PATH : Right front door
Unknown

MAIS : AIS-4 Head fracture
AIS-2 Brain concussion

INJ. SOURCE : Unknown
Unknown

CASE FACTS : Vehicle swerved off to the left of a narrow road, rotated 45 degrees clockwise, hit a patch of gravel on the ground and rolled over. Damage to top, doors.

DOOR LATCH/HINGE: Suspect latch failure. Right front door is intact, but open and out of line due to sheet metal strain in the hinge area. Pillars intact. Damage to the door consisted mainly of dents to the metal in the hinge area.

REMARK: Report says the right front and left rear doors were distorted due to prying, and the right rear door was jammed, with a missing lock button. Suspect this damage to the latch mechanisms was either previous damage, or was incurred during rescue. None of the doors' latch mechanisms appears in the slides.

ACCIDENT : 1982 NASS

CASE : 26 109W

VEHICLE : 1977 Chevrolet Camaro LT, 2-dr. sedan

CRASH MODE : Front

ROLLOVER : Yes, 4 or more quarter-turns.

OCCUPANT : Male, 18, driver

EJECT. PATH : Left door

MAIS : AIS-1 Shoulder abrasion

INJ. SOURCE : Ground

CASE FACTS : Vehicle swerved off to the left of a 2-lane road, hit a pole with the right front corner, rotated 90 degrees clockwise and rolled over. Damage to right side, front end.

DOOR LATCH/HINGE: Suspect latch failure. Left door is dented at the bottom, but in line and closed. Pillars intact. Damage to the whole left side consisted only of dents. Suspect the door opened on vehicle's impact with the pole.

ACCIDENT : 1982 NASS
CASE : 37 052T
VEHICLE : 1977 Pontiac Firebird, 2-dr. sedan
CRASH MODE : Front
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Female, 28, driver
EJECT. PATH : Right door
MAIS : AIS-1 Head abrasion
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a 2-lane highway, vehicle drifted off to the right, hit a pole with its right front corner, rotated 90 degrees clockwise, turned over and rotated another 90 degrees clockwise. Damage to right front panel, front end.
DOOR LATCH/HINGE: Both doors are gone. The right door hinges appear to be broken, and the door is also separated from the B pillar. Right A pillar pushed inward slightly at bottom. Suspect latch failure; since the door apparently detached at the hinges and latch but little damage occurred to the pillars, it is believe that the door sprang open due to latch failure, then became detached during the vehicle overturn.

ACCIDENT : 1982 NASS

CASE : 83 067W

VEHICLE : 1975 Oldsmobile Omega Salon, 2-dr. sedan

CRASH MODE : Non-collision

ROLLOVER : Yes, less than 4 quarter-turns.

OCCUPANT : Female, 16, driver

EJECT. PATH : Right door

MAIS : AIS-0

INJ. SOURCE : None

CASE FACTS : Travelling on a narrow road, vehicle skidded off to the left, rotated 90 degrees counterclockwise, rolled onto its side, went sideways on the shoulder and turned over onto its top. Damage to top, front end, front and rear panels.

DOOR LATCH/HINGE: Suspect latch failure. In the slides, the right door is open and dented, but in line and attached. A and B pillars are intact. Suspect the door sprang open due to latch failure.

ACCIDENT : 1982 NASS
CASE : 83 076T
VEHICLE : 1976 Chrysler Cordoba, 2-dr. sedan
CRASH MODE : Left side
ROLLOVER : No
OCCUPANT : Male, 21, driver
EJECT. PATH : Left door
MAIS : AIS-2 Leg fracture
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a narrow roadway, vehicle skidded to the left, rotated 90 degrees clockwise, skidded sideways with its rear wheels off the road, broke into two and stopped. Damage to left side.
DOOR LATCH/HINGE: Unable to tell. Report says car split in two behind the left B pillar. Slides show the left door is missing; it appears to be broken off at the hinges, but that is not conclusive; also, the A pillar is intact but the B pillar is missing. Left front panel is crushed. Status of left door latch and hinges is not clear. The damage to the car was very severe.

ACCIDENT : 1982 NASS

CASE : 05 173V

VEHICLE : 1955 Oldsmobile 88, 2-dr. sedan

CRASH MODE : Front at angle

ROLLOVER : No

OCCUPANT : Male, 26, passenger

EJECT. PATH : Right door

MAIS : AIS-1 Brain contusion

INJ. SOURCE : Unknown

CASE FACTS : At an intersection, vehicle hit an oncoming vehicle with the
left front corner. Damage to front, left front side.

DOOR LATCH/HINGE: Report says left front door sprung. Slides show both
doors intact and in line; damage occurred only to left front
panel. Suspect latch failure

ACCIDENT : 1982 NASS
CASE : 07 046S
VEHICLE : 1976 Pontiac Ventura, 2-dr. sedan
CRASH MODE : Front at angle
ROLLOVER : No
OCCUPANT : Male, 23, driver
EJECT. PATH : Left door
MAIS : AIS-3 Lung perforation
INJ. SOURCE : Steering assembly
CASE FACTS : Travelling on a 2-lane road, case vehicle encroached into
the oncoming lane and case vehicle hit a 4-door sedan in
front at an angle. Damage to both ends, hood, front right
side and door.
DOOR LATCH/HINGE: Suspect door latch failure. Both doors were dented and
bent in the metal near the hinge, but were closed and in
line. Pillars intact.

ACCIDENT : 1982 NASS
CASE : 86 127T
VEHICLE : 1972 Ford LTD, 2-dr. sedan
CRASH MODE : Right side with post
ROLLOVER : No
OCCUPANT : Male, 23, passenger
EJECT. PATH : Right door
MAIS : AIS-2 Brain concussion
INJ. SOURCE : Unknown

CASE FACTS : Rounding a curve on an urban local street, vehicle went off to the left, rotated 90 degrees clockwise, hit a post with the right side, and stopped. Damage to both sides, roof, rear end.

DOOR LATCH/HINGE: Suspect latch failure. The right side was hit directly beneath the B pillar, so that the rear end of the door, and the right rear panel adjacent to the door was buckled inward. Suspect that this impact broke the latch. Slides show the door itself being intact and in line. The crush at the B pillar is very severe; the right door is completely detached from the B pillar and is pushed forward somewhat. The impact was severe enough to have broken the latch or striker, but these do not appear clearly in the slides.

ACCIDENT : 1982 NASS
CASE : 04 218W
VEHICLE : 1971 Ford Mustang Fast Back, 2-dr. sedan
CRASH MODE : Undercarriage
ROLLOVER : No
OCCUPANT : Male, 20, driver
EJECT. PATH : Left door
MAIS : AIS-1 Face contusion
INJ. SOURCE : Windshield
CASE FACTS : Vehicle swerved off to the right of a narrow drive and hit a
culvert. Rotated 90 degrees clockwise and stopped. Damage
to front end.
DOOR LATCH/HINGE: Report says door flew open, but that latch was okay at
inspection. Door and pillars are intact. Suspect latch
failure. Believe the door sprang open during right side
impact.

ACCIDENT : 1982 NASS

CASE : 55 010K

VEHICLE : 1961 Chevrolet Belair Biscayne,
4-dr sedan

CRASH MODE : Right side

ROLLOVER : No

OCCUPANT : Female, 24, passenger
Male, 26, passenger
Male, 39, passenger

EJECT. PATH : Right rear door
Right rear door
Right rear door

MAIS : AIS-7 Unknown
AIS-7 Unknown
AIS-7 Unknown

INJ. SOURCE : Unknown
Unknown
Unknown

CASE FACTS : Crossing an intersection, vehicle was hit on right rear side
by an approaching truck. Damage to rear, right rear side.

DOOR LATCH/HINGE: Report indicates door latch failure. Door dented, but
attached and in line.

ACCIDENT : 1982 NASS
CASE : 6U 092T
VEHICLE : 1978 Ford Fairmont, 2-dr. sedan
CRASH MODE : Non-collision
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Male, 20, driver
 Male, 20, passenger
EJECT. PATH : Left door
 Left door
MAIS : AIS-1 Back contusion
 AIS-2 Face laceration
INJ. SOURCE : Unknown
 Unknown
CASE FACTS : Travelling on a 2-lane rural roadway, vehicle went off to
 the right, crossed the dirt shoulder onto a grassy slope,
 went back to the road and turned over. Damage to roof,
 right side.
DOOR LATCH/HINGE: Suspect latch failure. Slides show left door intact,
 though slightly dented on top. Pillars intact.

ACCIDENT : 1982 NASS

CASE : 53 103J

VEHICLE : 1980 Mercury Zephyr, 4-dr. sedan

CRASH MODE : Front on

ROLLOVER : No

OCCUPANT : Male, 36, driver

EJECT. PATH : Left front window

MAIS : AIS-3 Thigh fracture

INJ. SOURCE : Instrument panel

CASE FACTS : On a 2-lane roadway, vehicle drifted to the left and hit an oncoming truck head-on with the left front corner. Damage to left side, front, rear end, roof, trunk.

DOOR LATCH/HINGE: Unable to tell. Slides show that the entire left is missing, including A pillar, B pillar and both doors. Left front roof crushed. Severe damage to the left side, and separation of the doors and panels, made it impossible to conclude what happened to the doors.

ACCIDENT : 1982 NASS
CASE : 52 120T
VEHICLE : 1974 Ford Maverick, 2-dr. sedan
CRASH MODE : Top
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Female, 34, driver
EJECT. PATH : Left door
MAIS : AIS-5 Pelvis contusion
INJ. SOURCE : Ground
CASE FACTS : Travelling on rural interstate highway, vehicle swerved,
rolled over, and hit a guardrail with the top. Damage to
top, hood, trunk, sides, rear end, front end.
DOOR LATCH/HINGE: Suspect latch failure. Left door was still attached and
in line. The door was not hit or damaged; suspect it sprang
open during the accident.

ACCIDENT : 1982 NASS

CASE : 52 109J

VEHICLE : 1975 Toyota Celica, 2-dr. sedan

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 20, driver
Male, 21, passenger

EJECT. PATH : Left door
Windshield

MAIS : AIS-6 Chest crush
AIS-2 Face laceration

INJ. SOURCE : Exterior of other vehicle
Unknown

CASE FACTS : Vehicle was hit on left side by front of an approaching
vehicle at an urban intersection. Damage to left side,
front, rear.

DOOR LATCH/HINGE: Report states left door latch torn loose. However, the
slides show left door was also completely detached at the hinges.
Pillars intact. Suspect latch and hinge failure; it is
believed the door latch and hinges were broken by the left
side impact.

ACCIDENT : 1982 NASS
CASE : 52 098V
VEHICLE : 1972 Plymouth Duster, 2-dr. sedan
CRASH MODE : Rear end
ROLLOVER : No
OCCUPANT : Female, 26, driver
EJECT. PATH : Left door
MAIS : AIS-2 Hip fracture
INJ. SOURCE : Other object in environment
CASE FACTS : Travelling on a 2-lane roadway, vehicle was rear-ended by
the front of another vehicle. It went off the road, drove
270 degrees in a clockwise circle and hit a ditch. Damage to
right front, left rear corners.
DOOR LATCH/HINGE: Suspect latch failure. Doors appear intact and
undamaged, though the panels were slightly dented.

ACCIDENT : 1982 NASS
CASE : 81 161W
VEHICLE : 1969 Dodge Coronet, 2-dr. sedan
CRASH MODE : Front at angle
ROLLOVER : No
OCCUPANT : Male, 26, driver
EJECT. PATH : Left door
MAIS : AIS-1 Head contusion
INJ. SOURCE : Ground
CASE FACTS : Crossing an urban intersection, vehicle hit the right side
of another car which was making a left turn in front of it
from the opposite direction. Damage to front end.
DOOR LATCH/HINGE: Suspect latch failure. Both doors intact and attached.
Appears the latch was pulled out from the B pillar.

ACCIDENT : 1982 NASS
CASE : 52 039T
VEHICLE : 1977 Oldsmobile Cutlass Supreme Brougham, 2-dr. sedan
CRASH MODE : Left side
ROLLOVER : No
OCCUPANT : Male, 62, driver
EJECT. PATH : Left door
MAIS : AIS-1 Shoulder contusion
INJ. SOURCE : Side interior
CASE FACTS : Making a left turn onto a 2-lane, rural interstate, vehicle
was hit on the left rear side by vehicle coming from left.
Damage to left rear side.
DOOR LATCH/HINGE: Suspect latch failure. No slides available, but no
damage to doors is indicated in report.

ACCIDENT : 1982 NASS
CASE : 34 124S
VEHICLE : 1981 Oldsmobile Cutlass Supreme LS, 2-dr. sedan
CRASH MODE : Front end with curb
ROLLOVER : No
OCCUPANT : Male, 20, driver
EJECT. PATH : Left door
MAIS : AIS-6 Head crush
INJ. SOURCE : Other vehicle or object
CASE FACTS : Travelling on a 4-lane highway, vehicle strayed off to the left, hit a boulder with the left front corner, rotated 180 degrees counterclockwise and stopped. Damage to windshield, left side, rear window and end.
DOOR LATCH/HINGE: Suspect latch failed. Door was open, crushed and twisted, but still attached. A pillar intact but tilted backward. Left front panel torn off. Suspect that the door sprang open on impact, and was crushed, but left attached, by the impact to the left front corner.

ACCIDENT : 1982 NASS
CASE : 11 118T
VEHICLE : 1978 Chevrolet Monte Carlo, 2-dr. sedan
CRASH MODE : Front with tree
ROLLOVER : Yes, less than 4 quarter-turns
OCCUPANT : Male, 42, driver
EJECT. PATH : Left door
MAIS : AIS-5 Brain concussion
INJ. SOURCE : Window glass or frame
CASE FACTS : Vehicle swerved off to the left of a 2-lane road and hit a
tree with left front corner, rolled over. Damage to roof,
left front door, left and right sides, ends.
DOOR LATCH/HINGE: Suspect hinge failure. Left door was completely
detached and left front panel was crushed. A pillar was
twisted around. B pillar intact. Suspect that the impact to
the front left panel broke the hinges of the left door.

ACCIDENT : 1981 NASS

CASE : 53 U82M

VEHICLE : 1979 Chevrolet Camaro, 2-dr sedan

CRASH MODE : Other location (top)

ROLLOVER : Yes, 4 or more quarter turns

OCCUPANT : Male, 17, driver

EJECT. PATH : Right door

MAIS : AIS-7 Brain concussion

INJ. SOURCE : ground

CASE FACTS : Vehicle swerved off to the left of a two lane road, went into a deep ditch and turned over. Damage to top, right side.

DOOR LATCH/HINGE: Suspect latch failure. The right door is attached at the hinges, though dented and slightly bent. Sheet metal buckled in the hinge area caused the door to be out of line. Roof is crushed, causing pillars to tilt down and releasing the latch.

ACCIDENT : 1981 NASS

CASE : 28 028K

VEHICLE : 1974 Plymouth Satellite Sebring, 2-dr sedan

CRASH MODE : Right side with guardrail

ROLLOVER : No

OCCUPANT : Male, 27, driver

EJECT. PATH : Right door

MAIS : AIS-6 Chest crush

INJ. SOURCE : Unknown

CASE FACTS : Vehicle was travelling on a principal interstate, went off the road to the right, rotated 90 Deg. counterclockwise and hit a guardrail with the right front corner. Severe damage to all sides of car, especially the front.

DOOR LATCH/HINGE: Suspect latch failure. Right door was bent in the hinge area and jammed open, but in line and attached. Right A pillar tilted down.

ACCIDENT : 1981 NASS
CASE : 83 073M
VEHICLE : 1955 Chevrolet Bel Air, 2-dr sedan
CRASH MODE : Collision with parking meter, front end
ROLLOVER : No
OCCUPANT : Male, 34, driver
Male, 19, passenger
EJECT. PATH : Left door
None
MAIS : AIS-1, Head laceration
AIS-0
INJ. SOURCE : Window glass or frame
CASE FACTS : Vehicle collided in front at an angle with parking meter on a
local minor roadway. Severe damage to front end, left front
side and instrument panel.
DOOR LATCH/HINGE: Suspect left front door latch failure: driver was ejected
through left front door when he hit the window glass/frame.
The door is intact and in line; damage was limited to the
front panel, which was crushed.

ACCIDENT : 1981 NASS

CASE : 33 143K

VEHICLE : 1967 Pontiac Lemans, Convertible

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 20, driver

EJECT. PATH : Left door

MAIS : AIS-1 Face bone fracture

INJ. SOURCE : Unknown

CASE FACTS : Making a right turn off a narrow road, vehicle swerved off to the left, rotated 90 Deg. clockwise and hit some dense shrubbery. No damage indicated.

DOOR LATCH/HINGE: Suspect latch failure. No apparent damages to vehicle.

Report says the first harmful event was probably driver falling from the car.

ACCIDENT : 1981 NASS

CASE : 80 129L

VEHICLE : 1980 Chevrolet Monza, 2-dr sedan

CRASH MODE : Top

ROLLOVER : Yes, < 4 quarter turns

OCCUPANT : Female, 17, passenger

EJECT. PATH : Right door

MAIS : AIS-2 Brain concussion

INJ. SOURCE : Unknown

CASE FACTS : Travelling on a narrow road, vehicle swerved off to the right, hit a concrete culvert head on, flipped over and then landed upright. Minor dents to right panels.

DOOR LATCH/HINGE: Report states that the right door latch shows signs of failure. Slides show door in line and attached, but open slightly; the A pillar tilted sideways; both A and C pillars are intact.

ACCIDENT : 1981 NASS

CASE : 02 114M

VEHICLE : 1975 Plymouth Valiant, 4-dr sedan

CRASH MODE : Left side with bush

ROLLOVER : No

OCCUPANT : Male, 41, driver

EJECT. PATH : Left front door

MAIS : AIS-1 Shoulder strain

INJ. SOURCE : Impact force

CASE FACTS : Vehicle was rounding a curve in a urban, principal roadway.

It swerved to the right off the road, rotated 90 Deg.

clockwise and hit some bushes with the left side. Damage to
the left front side and door.

DOOR LATCH/HINGE: Suspect door latch failure. No visible damage to side of
car, but report states door opened upon hitting bushes.

ACCIDENT : 1981 NASS
CASE : 52 158L
VEHICLE : 1974 Chevrolet Caprice Classic, 4-dr sedan
CRASH MODE : Left side collision
ROLLOVER : No
OCCUPANT : Female, 60, driver
EJECT. PATH : Left front door
MAIS : AIS-5 Abdomen rupture
INJ. SOURCE : side interior surface
CASE FACTS : Vehicle was hit on the left side in the middle of an
intersection. Rotated 180 Deg. counterclockwise and stopped.
Damage to left side, front end, rear end, windshield.
DOOR LATCH/HINGE: Door was still attached and in line but buckled inward
due to collision. Suspect latch failure. Pillars intact.

ACCIDENT : 1981 NASS
CASE : 80 142L
VEHICLE : 1961 Volkswagen Bug, 2-dr sedan
CRASH MODE : Front angle collision
ROLLOVER : None
OCCUPANT : Male, 25, driver
EJECT. PATH : Left door
MAIS : AIS-4 Spleen rupture
INJ. SOURCE : Steering assembly
CASE FACTS : Front end of case vehicle collided at an angle with side of
other vehicle on a rural, minor arterial roadway. Severe
damage to the front end, damage to rear end, windshield and
rear window, and left front door.
DOOR LATCH/HINGE: All doors and pillars were intact and attached after
collision, though the A pillar and left front door were
dented by occupant's bodies. Report states force of occupant
impact caused left front door to open. Suspect latch
failure.

ACCIDENT : 1981 NASS

CASE : 80 089L

VEHICLE : 1975 Mazda RX-4, 3/5-dr hatchback coupe

CRASH MODE : Front end

ROLLOVER : No

OCCUPANT : Female, 19, passenger

EJECT. PATH : Right front door

MAIS : AIS-4 Brain concussion

INJ. SOURCE : Ground

CASE FACTS : Travelling on an urban road, vehicle swerved off the right
and collided front on with traffic light support pole.

Damage to windshield, right side, trunk.

DOOR LATCH/HINGE: Suspect hinge failure. The right front door was detached, along with the A pillar and door hinges. Right rear door was detached at hinges. B pillar detached at the bottom. Right front panel was crushed. Extensive damage to the right side, and absence of the front door and hinges, made it impossible to ascertain what happened to the front door hinge and latch.

ACCIDENT : 1981 NASS

CASE : 03 092K

VEHICLE : 1963 Oldsmobile F-85, 4-dr sedan

CRASH MODE : Head on

ROLLOVER : No

OCCUPANT : Male, 15, passenger

EJECT. PATH : Right front door

MAIS : AIS-3 Head Fracture

INJ. SOURCE : A pillar

CASE FACTS : On a highway, vehicle went off the road and hit a bridge support head-on. Damage to front, rear end.

DOOR LATCH/HINGE: Suspect latch failure. Right front door was still attached, though sheet metal shows strains near the top hinge. Right front panel was almost completely separated. Right A pillar is crushed. Suspect the blow to the right front side caused the right front door to spring open.

ACCIDENT : 1981 NASS
CASE : 76 077M
VEHICLE : 1966 Volkswagen 1300, 2-dr sedan
CRASH MODE : Collision with embankment
ROLLOVER : Yes, 4 or more quarter turns
OCCUPANT : Male, 21, driver
EJECT. PATH : Left door
MAIS : AIS-1 Ear laceration
INJ. SOURCE : Unknown
CASE FACTS : Vehicle was travelling on rural principal arterial roadway,
swerved off struck a sloped embankment, rolled over 360 deg.
or more. Severe damage to roof, trunk, hood, ends, sides.
DOOR LATCH/HINGE : Suspect both latch and hinge failure. Report states
that both doors came open during the accident. In the
slides, the doors were bent and dented. A and B pillars were
crushed along with roof. However, the left door was detached
at the top hinge and out of line, indicating hinge failure.
The left A pillar was crushed, which pushed the left door
downward.

ACCIDENT : 1981 NASS

CASE : 77 113L

VEHICLE : 1963 Ford Falcon station wagon

CRASH MODE : Front and rear at angle with guard rails

ROLLOVER : No

OCCUPANT : Male, 19, driver

EJECT. PATH : Right front door

MAIS : AIS-1 Abrasions

INJ. SOURCE : Unknown

CASE FACTS : Vehicle was travelling on 8-lane interstate highway. It swerved right, hit the right guardrail with the right front corner, crossed to the other side and rotated about 100 deg. clockwise, hit the middle guardrail with the right rear corner.

DOOR LATCH/HINGE: Suspect latch failure. Right door was open and dented, but still attached and in line. Pillars intact.

ACCIDENT : 1981 NASS

CASE : 77 124L

VEHICLE : 1974 Plymouth Duster, 2-dr. sedan

CRASH MODE : Left side with flower bed border

ROLLOVER : Yes, < 4 quarter turns

OCCUPANT : Male, 17, passenger

Male, 15, passenger

EJECT. PATH : Right door

Right door

MAIS : AIS-3 upper arm fracture

AIS-2 Brain concussion

INJ. SOURCE : Unknown

Unknown

CASE FACTS : Vehicle was travelling on urban, minor arterial 4-lane roadway. It swerved off the road, hit a flower bed on the curb on the right with its side, rotated 90 degrees clockwise, off the curb onto a side street, hit a low wooden plant and turned over. Damage to whole left side, left and rear windows, windshield, and hood and trunk.

DOOR LATCH/HINGE: Suspect latch failure. Right door was intact, in line closed, and attached. The right front door was not damaged, but believe latch failure caused occupant ejection through the right front door.

ACCIDENT : 1981 NASS
CASE : 52 223L
VEHICLE : 1972 Dodge Charger, 2-dr sedan
CRASH MODE : Front with ground
ROLLOVER : No
OCCUPANT : Male, 27, driver
EJECT. PATH : Left door
MAIS : AIS-3 Shoulder dislocation
INJ. SOURCE : Side interior surface

CASE FACTS : Vehicle was travelling on a two-lane, rural minor roadway.

It swerved off the road, rotated 90 degrees clockwise and hit a boxed-in, upraised section of ground on the side. Damage to front end, hood, left door, windshield, rear window, rear end, part of the roof.

DOOR LATCH/HINGE: Door latch failure. Door on left side was still attached and in line but report says it sprang open during accident, resulting in complete ejection.

ACCIDENT : 1981 NASS

CASE : 52 226L

VEHICLE : 1980 Mazda GLC, 3/5 dr hatchback coupe

CRASH MODE : Right side with ditch

ROLLOVER : Yes, < 4 quarter turns

OCCUPANT : Female, 23, passenger

EJECT. PATH : Right front door

MAIS : AIS-2 shoulder fracture

INJ. SOURCE : unknown

CASE FACTS : Vehicle was travelling on a two-lane rural roadway. It swerved off to the right, hit the edge of a ditch, rotated 180 degrees clockwise and landed upside down. Damage to the roof, both sides and windows, windshield, rear window and hood torn off.

DOOR LATCH/HINGE: Suspect latch failure. Slides show the right door being buckled inward at the middle, but in line and attached; pillars intact, though the right A pillar tilted sideways.

ACCIDENT : 1981 NASS

CASE : 52 343L

VEHICLE : 1974 Ford Mustang II, 3/5 dr hatchback coupe

CRASH MODE : Left side with tree

ROLLOVER : Yes, < 4 quarter turns

OCCUPANT : Male, 19, driver

EJECT. PATH : Left front door

MAIS : AIS-3 Ankle crush

INJ. SOURCE : Floor

CASE FACTS : Vehicle was travelling on minor rural roadway. It swerved off to the right, rotated 90 degrees clockwise, went sideways down a steep embankment, hit a tree with the left rear corner then another tree with the right rear corner. Severe damage to all parts of the car.

DOOR LATCH/HINGE: Report says left front door latch failed. Doors still attached but crushed.

ACCIDENT : 1981 NASS

CASE : 78 115I

VEHICLE : 1974 Pontiac Grand Safari station wagon

CRASH MODE : Head on collision

ROLLOVER : No

OCCUPANT : Male, 31, driver

EJECT. PATH : Left front door

MAIS : AIS-1 Face contusion

INJ. SOURCE : Windshield

CASE FACTS : Vehicle hit a pickup truck which was attempting to make a left turn, coming from the opposite direction. No damage indicated.

DOOR LATCH/HINGE: Door latch failure: report says left front door sprang open during accident resulting in partial ejection. No slides available of this vehicle.

ACCIDENT : 1981 NASS
CASE : 02 192M
VEHICLE : 1974 Dodge Charger, 2-dr sedan
CRASH MODE : Overturn, collision with fence
ROLLOVER : Yes, 4 or more quarter turns
OCCUPANT : Male, 18, passenger
EJECT. PATH : Right door
MAIS : AIS-1 Head laceration
INJ. SOURCE : Window glass or frame
CASE FACTS : Vehicle was travelling on a 4-lane rural principal road. It swerved off the the right, rotated 90 degrees clockwise, hit a low fence, turned over and landed upright. Damage to front, rear, right side, roof.
DOOR LATCH/HINGE: Suspect door latch failure. The right door was completely detached and torn off during accident. Right A pillar tilted down and backwards when roof was crushed. Suspect the door sprang open, then was detached due to the hinge damage as the vehicle overturned.

ACCIDENT : 1981 NASS

CASE : 03 176L

VEHICLE : 1972 Ford Maverick, 2-dr sedan

CRASH MODE : Right side with fence post

ROLLOVER : No

OCCUPANT : Female, 19, passenger

EJECT. PATH : Right door

MAIS : AIS-7 unknown

INJ. SOURCE : Unknown

CASE FACTS : Vehicle was on an urban principal road. Making a left turn at an intersection it went onto the curb on the corner, hit a fence post, role over it and stopped. Damage to front and rear ends, right side including door hinge area. Both windshield and rear window out.

DOOR LATCH/HINGE: Suspect latch failure. Vehicle impact with post was at the middle of the door so the right door was bent and jammed open, but it was in line and attached at the hinges. Pillars intact.

ACCIDENT : 1981 NASS
CASE : 03 258K
VEHICLE : 1976 Buick Century, 4-dr sedan
CRASH MODE : Side with a barrel
ROLLOVER : Yes, details unknown
OCCUPANT : Male, 24, driver
EJECT. PATH : Right front door
MAIS : AIS-5 burns
INJ. SOURCE : Noncontact injury source
CASE FACTS : Vehicle was exiting from a principal urban highway. It swerved off to the right from the two-lane exit, hit some barrels with the right side, went back to the road, overturned and stopped. Severe burns. Hood crushed. Front half of car mutilated.
DOOR LATCH/HINGE: Suspect latch failure. Right front door is still in line and attached, even though it was deeply dented. Impact to the front right panel caused buckling and the right door pushed down slightly, but the door was still attached at the hinges.

ACCIDENT : 1981 NASS
CASE : 26 013G
VEHICLE : 1965 Volkswagen Beetle, 2-dr sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Female, 25, driver
 Female, 6, passenger
EJECT. PATH : Left door
 Right door
MAIS : AIS-3 lower leg fracture
 AIS-4 chest injury
INJ. SOURCE : Unknown
 Exterior surface on tires
CASE FACTS : Crossing an urban intersection, vehicle was hit on the right
 front side by a van coming from the right.
DOOR LATCH/HINGE: Suspect latch failure. Right door was open, attached but
 bent, especially in the hinge area, so it was jammed open.
 Left door was undamaged; suspect latch failure in this door.
 Right A pillar tilted sideways.

ACCIDENT : 1981 NASS

CASE : 26 094M

VEHICLE : 1968 Volkswagen Bug, 2-dr sedan

CRASH MODE : Front-on with concrete post

ROLLOVER : Yes, < 4 quarter turns

OCCUPANT : Male, 19, driver

EJECT. PATH : Left door

MAIS : AIS-2 shoulder fracture

INJ. SOURCE : Unknown

CASE FACTS : Vehicle was rounding a curve on a 2-lane rural road. It swerved off to the right, hit a concrete post then a tree, rotated 180 degrees clockwise and stopped. Damage to front, left front side and door, windshield.

DOOR LATCH/HINGE: Suspect latch failure. Left front door was strained in the hinge area during the frontal impact so it was open, bent out of line and could not close. However, it was still attached at the hinges. Suspect sheet metal buckling and latch failure caused the door to spring open.

ACCIDENT : 1981 NASS
CASE : 26 245L
VEHICLE : 1974 Ford Maverick, 4-dr sedan
CRASH MODE : Right front end with concrete post
ROLLOVER : No
OCCUPANT : Female, 18, passenger
EJECT. PATH : Right front door
MAIS : AIS-3 arm fracture
INJ. SOURCE : Side interior surface
CASE FACTS : Travelling on a local, rural road, vehicle drifted off to the right, skidded along a fence with the right side and hit a post with the right front corner. Damage to right side, right front door, left rear side, roof.
DOOR LATCH/HINGE: Unable to tell. Suspect hinge failure. Right front door was detached at the top hinge and crushed. Right A pillar was detached at the bottom, and the B pillar was gone.
REMARK: The rear door was also detached at the top hinge.

ACCIDENT : 1981 NASS
CASE : 33 168L
VEHICLE : 1974 Pontiac Grandville, 2-dr sedan
CRASH MODE : Non-collision
ROLLOVER : No
OCCUPANT : Female, 78, passenger
EJECT. PATH : Right door
MAIS : AIS-1 ankle sprain
INJ. SOURCE : Ground
CASE FACTS : Making a left turn from driveway onto an urban road,
passenger fell out of car. No damage to vehicle.
DOOR LATCH/HINGE: Suspect latch failure. No damage to vehicle.

ACCIDENT : 1981 NASS

CASE : 51 031K

VEHICLE : 1974 Chevrolet Impala V-8, 2-dr sedan

CRASH MODE : Right front corner with fire hydrant

ROLLOVER : No

OCCUPANT : Female, 62, passenger

EJECT. PATH : Right door

MAIS : AIS-7 unknown

INJ. SOURCE : Unknown

CASE FACTS : Travelling on an urban road, vehicle wandered off to the right onto the curb, hit a fire hydrant head-on, knocked it down, hit a concrete light pole with the right front corner, rotated 90 degrees clockwise and stopped. Damage to right front corner, left rear corner.

DOOR LATCH/HINGE: Report states right front door popped open. Slides show the sheet metal bent at the right front hinge, but hinge failure was not suspected as the door was still attached and in line. Pillars intact.

ACCIDENT : 1981 NASS

CASE : 52 326L

VEHICLE : 1981 BMW 320i, 2-dr sedan

CRASH MODE : Top with ditch, head on

ROLLOVER : No

OCCUPANT : Female, 26, driver

EJECT. PATH : Left door

MAIS : AIS-2 Skull fracture

INJ. SOURCE : Unknown

CASE FACTS : Travelling on two-lane rural road, vehicle swerved to the left off the road where there was a ditch. It hit the side of the ditch head on, then went into some bushes and rotated 180 degrees counterclockwise. Damage to trunk, hood, left side, roof.

DOOR LATCH/HINGE: Report says a vine snagged the driver's door handle, pulling the door open. This may cause door hinge failure: left door is completely detached, and the top hinge is visibly broken. A pillar tilted down. The roof over the left door and A pillar is dented.

ACCIDENT : 1981 NASS
CASE : 53 086M
VEHICLE : 1973 Ford Gran Torino 2 dr sedan
CRASH MODE : Rear ended by front of other vehicle
ROLLOVER : No
OCCUPANT : Male, 19, driver
Female, < 1, passenger
EJECT. PATH : Left door
Left door (fell on her father)
MAIS : AIS-0
AIS-0
INJ. SOURCE : None
None
CASE FACTS : On a 2-lane rural roadway, vehicle was rear-ended by another
car on the left rear corner. It rotated 90 degrees
clockwise, went off the road and hit the sloped shoulder.
Damage to left side, front end.
DOOR LATCH/HINGE: Report says the left door opened on impact. Left door
was crushed, but attached at the hinges. Left rear panel
separated. Pillars intact. Latch failure.

ACCIDENT : 1981 NASS
CASE : 79 098N
VEHICLE : 1967 Pontiac Lemans, 2-dr sedan
CRASH MODE : Non-collision
ROLLOVER : No
OCCUPANT : Female, 16, passenger
EJECT. PATH : Right door
MAIS : AIS-1 Face laceration
INJ. SOURCE : Ground
CASE FACTS : Rounding a sharp right-hand curve, occupant fell out of
vehicle. No damage to vehicle.
DOOR LATCH/HINGE: Suspect latch failure. No damage to vehicle occurred.

ACCIDENT : 1981 NASS

CASE : 07 109H

VEHICLE : 1973 Plymouth Fury II, 2-dr sedan

CRASH MODE : Right side

RULLOVER : No

OCCUPANT : Female, 16, passenger

EJECT. PATH : Right door

MAIS : AIS-1 Face laceration

INJ. SOURCE : Ground

CASE FACTS : Crossing an intersection in a principal urban roadway,
vehicle was struck in right rear side by a car coming from
the right. It stopped beyond the point of impact. Damage to
right side, including doors, trunk and rear end.

DOOR LATCH/HINGE: Suspect latch failure. The door is still attached, open
but in line, and pillars are intact. It is theorized that
when right rear side was hit, the right door sprang open.

ACCIDENT : 1981 NASS
CASE : 84 094G
VEHICLE : 1976 Chevrolet Malibu, 4-dr sedan
CRASH MODE : Front at angle
ROLLOVER : No
OCCUPANT : Male, 15, passenger
EJECT. PATH : Right front door
MAIS : AIS-1 Head laceration
INJ. SOURCE : Instrument panel
CASE FACTS : Parked at the left side of a rural minor arterial roadway,
vehicle was hit on the left front corner by a 2-dr sedan and
pushed backward and to the right. (There were other vehicles
involved in the case but no ejections) Damage to left front
side.
DOOR LATCH/HINGE: Suspect latch failure. Slides show no damage to the
entire right side including doors.

ACCIDENT : 1981 NASS

CASE : 26 234M

VEHICLE : 1976 Toyota Celica liftback, 3/5-dr hatchback coupe

CRASH MODE : Right side with pole

ROLLOVER : No

OCCUPANT : Male, 30, driver

EJECT. PATH : Right front door

MAIS : AIS-1, Face fracture

INJ. SOURCE : Unknown

CASE FACTS : Vehicle was travelling on a local rural road. Rounding a curve it went halfway off the road and sideswiped a pole. Damage to right middle side. Right door torn off.

DOOR LATCH/HINGE: Suspect door latch failure. Right front door was missing. Right rear panel was crushed. Right front panel was only dented. Pillars intact.

REMARK: Since the door was torn off with little damage to the pillars and front panel, it is theorized that the door sprang open prior to impact with the pole, then was torn off during the impact, thus indicating a latch failure.

ACCIDENT : 1981 NASS

CASE : 52 125K

VEHICLE : 1975 Oldsmobile Omega Salon, 3/5 dr hatchback coupe

CRASH MODE : Collision with embankment

ROLLOVER : Yes, < 4 quarter turns

OCCUPANT : Female, 16, passenger

EJECT. PATH : Right front door

MAIS : AIS-3 arm amputation

INJ. SOURCE : Roof side rails

CASE FACTS : Vehicle was travelling on a rural, minor roadway. It began to skid and rotate clockwise, so that the right front wheel hit the embankment and started to ride up the embankment. Car turned over, came to stop on road. Severe damage to roof, hood, trunk, right front door and whole right side.

DOOR LATCH/HINGE: Suspect door latch failure since the right front door was in line and intact, though open. It is theorized that the right door was forced open when the roof was crushed. The report states the right front door was opened by rescue personnel and its handle was broken off during extrication. Suspect that the door sprang open, resulting in ejection, then was closed again during vehicle rollover. The door could not be closely examined in the slides; in the report there were indications of skin and hair transfer, but there is no explicit mention of the occupant hitting the door while it was closed. The door does not appear to be bent outward.

REMARK : The left front door was opened and could not close. It was jammed at the latch; suspect latch failure. Both doors opened.

ACCIDENT : 1980 NASS

CASE : U2 254L

VEHICLE : 1972 AMC Gremlin, 2-dr sedan

CRASH MODE : top

ROLLOVER : yes, <4 quarter turns

OCCUPANT : Male, 26, driver

EJECT. PATH : Left door

MAIS : AIS-2 shoulder dislocation

INJ. SOURCE : Roof pillar supports

CASE FACTS : Travelling on a 2-lane road, vehicle swerved off to the left. It went into a heavily wooded area on the left, hit several trees, rolled over, rotated 180 degrees counter-clockwise and stopped. Damage to top, front end, front panels.

DOOR LATCH/HINGE: Report states that the left door striker is loose, and hinges rusted, and that the pin is lost for the top hinge. In the slides, the door appears to be in line, and slightly open. Pillars are intact. Suspect hinge and latch failure. Damage to left side consisted of dents only. Suspect rust and age weakened the hinges and latch mechanism.

ACCIDENT : 1980 NASS
CASE : 76 031L
VEHICLE : 1959 Austin Healy 3000 Convertible
CRASH MODE : Front
ROLLOVER : No
OCCUPANT : Male, 53, driver
EJECT. PATH : Left front door
MAIS : AIS-4 Chest fracture
INJ. SOURCE : Unknown
CASE FACTS : Travelling on a narrow road, rounding a right hand curve,
vehicle swerved off to the right, rotated 90 Deg. clockwise,
hit the right barrier head-on, rotated 180 Deg. clockwise and
stopped. Damage to front, dents to sides.
DOOR LATCH/HINGE: Suspect hinge failure. Left door is detached at top
hinge, intact but open and out of line. Otherwise, the
left side suffered only sheet metal damage. Pillars are
intact, but appear to swept back slightly.

ACCIDENT : 1980 NASS

CASE : 76 070T

VEHICLE : 1970 Ford thunderbird 2-dr sedan

CRASH MODE : Left side

ROLLOVER : No

OCCUPANT : Male, 17, driver

EJECT. PATH : Left door

MAIS : AIS-2 Face laceration

INJ. SOURCE : Windshield

CASE FACTS : Travelling on a 2-lane road, vehicle was hit on left front panel by an oncoming car which had come into its lane. It rotated 90 Deg. counterclockwise and stopped.

Damage to left side, front.

DOOR LATCH/HINGE: Suspect latch failure. The left door is open, in line and attached. However, the outer panel of it is partly separated, and it appears the entire rear end of the door, containing the latch mechanism, was torn off. Pillars intact. Front left panel crushed.

ACCIDENT : 1980 NASS
CASE : 76 132K
VEHICLE : 1966 Volkswagen Squareback 1600, 3/5-dr hatchback coupe
CRASH MODE : Left side
ROLLOVER : Yes, 4 or more quarter-turns
OCCUPANT : Male, 34, driver
EJECT. PATH : Left front door
MAIS : AIS-3 Head Fracture
INJ. SOURCE : Unknown
CASE FACTS : Rounding a left-hand curve on a narrow road, vehicle swerved off to the right, hit a delineator pole with the right rear side, rotated 90 Deg. counterclockwise, hit the curb with the right rear wheel and rolled over. Damage to left side, right front side.
DOOR LATCH/HINGE: Suspect latch and hinge failure. Left front door is detached at the top hinge, and bent almost in half. However, the door is also separated from the B pillar. The A pillar was tilted downward, and the metal on the left side is bent upward slightly at the B pillar. Suspect the left front door sprang open, then was damaged during vehicle overturn.

ACCIDENT : 1980 NASS
CASE : 28 016G
VEHICLE : 1973 BMW 2002, 2-dr sedan
CRASH MODE : Left side
ROLLOVER : No
OCCUPANT : Male, 32, driver
EJECT. PATH : Left door
MAIS : AIS-6 head crush
INJ. SOURCE : Undercarriage
CASE FACTS : Crossing an intersection, vehicle was hit on left side by a tractor-trailer coming from the left. It rotated 180 Deg. clockwise and stopped. Damage to front end, hood, left front panel and door.
DOOR LATCH/HINGE: Suspect latch failure. Left door is in line and attached, but slightly open. Latch mechanism was torn off of the B pillar. Sheet metal is strained in the left door hinge area, but the hinges are intact. Pillars intact. Impact occurred only to front end and left front panel.

ACCIDENT : 1980 NASS
CASE : 28 078K
VEHICLE : 1970 Mercury Cougar, 2-dr sedan
CRASH MODE : Right side
ROLLOVER : No
OCCUPANT : Male, 18, passenger
EJECT. PATH : Right door
MAIS : AIS-6 Brain laceration
INJ. SOURCE : Unknown
CASE FACTS : Rounding a left hand curve on a narrow road, the vehicle swerved off to the right. Its right front side hit a utility pole on the curb, then the vehicle rotated 45 degrees clockwise, and the vehicle's right front side hit some rocks on the curb. The vehicle rotated another 45 degrees clockwise and stopped. Damage to front end, right side.
DOOR LATCH/HINGE: Unable to tell. The right door is completely separated, torn off at hinges and latch. The right rear panel is crushed and torn in the middle and partly separated. The right side of the roof is separated, as is the right A pillar. Damage to whole right side is very severe.
REMARK: The report indicates there was separation of the left door at the hinges, but in the slides door is slightly open, intact, and approximately in line. Left rear panel is crushed and buckled inward at the B pillar.

ACCIDENT : 1980 NASS

CASE : 52 044H

VEHICLE : 1965 Volkswagen Beetle, 2-dr sedan

CRASH MODE : Front

ROLLOVER : No

OCCUPANT : Male, 64, driver

EJECT. PATH : Left door

MAIS : AIS-1 Head laceration

INJ. SOURCE : Unknown

CASE FACTS : Making a left turn at an intersection, vehicle hit the right side of a truck coming from the left. The vehicle rotated 90 Deg. clockwise, skidded forward. Damage to left front corner.

DOOR LATCH/HINGE: Suspect latch failure. Doors are in line, closed, intact. Damage overall was minimal, and only to the left front corner.

ACCIDENT : 1980 NASS

CASE : 51 324M

VEHICLE : 1970 AMC Gremlin, 6 cyl. 3/5-dr hatchback coupe

CRASH MODE : Front

ROLLOVER : No

OCCUPANT : Female, 18, driver

EJECT. PATH : Left front door

MAIS : AIS-1 Head contusion

INJ. SOURCE : Ground

CASE FACTS : Making a sharp right turn on a narrow road, occupant was ejected. Vehicle then hit a fence head on. Only minor scratches to vehicle.

DOOR LATCH/HINGE: Suspect latch failure. Doors are closed and in line. No visible damage.

ACCIDENT : 1980 NASS

CASE : 52 079L

VEHICLE : 1970 Mercury Montego MX 4-dr sedan

CRASH MODE : Other location

ROLLOVER : Yes, < 4 quarter turns

OCCUPANT : Female, 27, driver

EJECT. PATH : Right front door

MAIS : AIS-2 Skull Fracture

INJ. SOURCE : Unknown

CASE FACTS : Rounding a left hand curve on a narrow road, vehicle swerved off to the right, hit a barrel on the front end, flipped over, rotated 180 degrees clockwise on its top and stopped. Damage to right front side, top.

DOOR LATCH/HINGE: Suspect latch and hinge failure. Right front door is open, crushed, detached at the top hinge, and also broken off from the B pillar. A pillar was pushed forward. Suspect the door opened first, then broke off at the hinges during vehicle rollover.

ACCIDENT : 1980 NASS

CASE : 77 203L

VEHICLE : 1976 Oldsmobile Toronado Brougham 2-dr sedan

CRASH MODE : Noncollision

ROLLOVER : No

OCCUPANT : Male, 39, driver

EJECT. PATH : Left door

MAIS : AIS-0

INJ. SOURCE : None

CASE FACTS : Travelling on a 4-lane high way, vehicle's tire blew out.

The vehicle swerved onto the left shoulder, rotated 90 degrees clockwise, skidded sideways and stopped. Occupant ejected. No damage.

DOOR LATCH/HINGE: Suspect latch failure. No damage to car.

7L 24.2-100
Shaw-Walker
Slide door
assembly

Form DOT F 172
FORMERLY FORM D

